

Faculty Collaboration and Equity: UMass ADVANCE Survey Report

July 2020

Ethel L. Mickey, *UMass ADVANCE Postdoctoral Research Associate*

EXECUTIVE SUMMARY

Research Questions

Collaboration plays a key role in scientific discovery and innovation, driving knowledge production and funding in the sciences, engineering, and technology. However, universities historically reward individual attainment over collaborative engagement. UMass ADVANCE, funded by the National Science Foundation (NSF), focuses on cultivating faculty equity, inclusion, and success through the power of collaboration to advance the careers of women faculty, including women of color, in science and engineering. This report assesses UMass STEM faculty experiences (collected in a survey described below) related to collaboration in three key areas: (1) **research**; (2) **inclusive community-building**; and (3) **decision-making**. Ultimately, the survey is designed to understand if there is gender and racial equity in the distribution of resources to promote faculty success and inclusion. What is going well for faculty? Do all STEM faculty members have similar and positive experiences with and access to collaboration? Do all STEM faculty have similar and positive experiences regarding inclusion and decision-making? What areas need improvement?

Methods

UMass ADVANCE administered a climate survey to all faculty members in Fall 2018-Winter 2019 to capture faculty experiences, and whether and how these experiences vary for different identity groups. We received responses from 655 respondents, with 419 of these in the STEM fields targeted by the NSF grant, for a STEM faculty response rate of 58%. Survey results inform best practice models, and the team will conduct the same survey in 2022-2023 (the fifth and final year of the award) to measure the UMass ADVANCE project impact and assess change over time.

Summary of Findings

Survey results indicate several barriers to STEM women faculty's collaborations compared to men's in research, inclusion, and decision-making. While all STEM faculty respondents at UMass report that they enjoy collaborating on research, women express greater dissatisfaction with opportunities for and recognition of research collaboration than men. Women from underrepresented racial minority (URM) groups in STEM are the least satisfied with research collaboration opportunities, and are deeply unsatisfied with access to collaboration resources on campus. While external funding drives men's collaborations, shared internal funding appears to play a key role in facilitating women's collaborations. In terms of inclusion, STEM women feel less connected to their departments compared to men, less accepted by their colleagues, and less satisfied with professional interactions. STEM women faculty also feel substantially less valued than men for their research, and women faculty from URM groups feel especially undervalued for their research compared to both white and Asian women and men from URM groups. Women generally report that their departments are less collegial, respectful, cooperative, supportive, equitable, fair, and inclusive than men. For decision-making, STEM women faculty are less likely than colleagues who are men to see decision-making in the department as fair or transparent, and less likely to believe their Chair/Head or colleagues value their opinions. Women at the appropriate ranks, especially Black, Latina, and American Indian or Alaskan Native women, also have much less clarity on criteria for tenure, and particularly promotion to Professor.

This report further examines these outcomes looking toward intersectional identities: race and gender, sexuality and gender, rank and gender, nationality and gender, caregiving status and gender. Intersectional analyses reveal that women of color, foreign-born women, LGBTQ women, Associate women, and caregiving women in STEM face unique barriers to being fully included on campus and heard in departments compared to their male counterparts.

Implications

The baseline campus survey informs UMass ADVANCE goals, interventions, and programming. Survey data suggest that we need interventions aimed at ensuring that all faculty can access resources and relationships to support collaborative research. STEM faculty, and especially women, are generally dissatisfied with collaboration opportunities on campus. ADVANCE provides opportunities for faculty to meet and locate potential collaborators. Because internal funding especially drives women's collaborative research on campus, ADVANCE provides several internal grant funding opportunities. To address STEM women's lesser sense of clarity around tenure and promotion (including promotion to Professor) ADVANCE will work with campus partners to provide mentorship best practices and trainings in this area. ADVANCE also focuses on leadership trainings and interventions addressed at department chairs and heads, as women report feeling less valued and heard than men in departmental decision-making. Finally, building a healthy and inclusive community requires time and regular opportunities for faculty members to meaningfully interact with one another. UMass ADVANCE interventions will develop long-term, sustainable opportunities for faculty to interact more equitably. Central to our interventions is faculty mentoring. We also are committed to recognition of women's research excellence, as women STEM faculty, and particularly Black and Brown women faculty, feel deeply undervalued for their research. By using the faculty survey data to inform our interventions, we aim to support greater equity on campus. Improving collaboration, climate, and decision-making for women in STEM will enhance the entire campus community.

Acknowledgements: Thanks for helpful input from members of the UMass ADVANCE Leadership Team including Joya Misra, James Allan, Donna Baron, Sergio Breña, Dessie Clark, Biju Dasgupta, Jennifer Normanly, and Laurel Smith-Doerr. This research was funded by NSF ADVANCE-IT Award #1824090, "Collaboration and Equity: The Resources, Relationships, and Recognition (R3) Model for Advancing Women and Underrepresented Faculty in Science and Engineering." All findings and opinions are the author's and do not necessarily represent those of the National Science Foundation (NSF).

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Introduction

Collaboration plays a key role in scientific discovery and innovation, driving knowledge production and funding in the sciences, engineering, and technology. However, universities historically reward individual attainment over collaborative engagement. More so, universities have traditionally been masculine and male-dominated domains, especially in STEM, where women continue to be underrepresented in certain fields. Negative stereotypes and gender status beliefs shape evaluations of women's competence in STEM and their collaboration experiences in unequal ways.¹⁻² UMass ADVANCE, funded by the National Science Foundation (NSF), focuses on cultivating faculty equity, inclusion, and success through the power of collaboration to advance the careers of women faculty, including women of color, in science and engineering. Collaboration refers to people working together to solve problems, and is related to gender and racial gaps in faculty retention, advancement, and career satisfaction.³

We focus on collaboration in the contexts of research, inclusive communities, and decision-making. Women faculty in traditional STEM departments tend to have fewer resources for collaborative research, and as such experience more limited career opportunity structures than men, with faculty gender gaps in rank, satisfaction, and funding.⁴⁻⁵ Collaboration is also crucial to career development, often in the form of mentoring relationships. Women and women of color in STEM may be excluded from informal networks, experiencing isolation and difficulty locating mentors.⁶ Building inclusive communities in which faculty form connections and acquire tacit knowledge to navigate academic life is critical for the retention of diverse faculty members. Collaborative decision-making in departments further facilitates equity, as research shows that less hierarchical workplaces foster transparency and inclusion.⁷

The baseline campus survey informs UMass ADVANCE goals, interventions, and programming. By collecting survey data on faculty perceptions of climate, collaboration, and decision-making, we will develop new mechanisms to support greater equity on campus.

Methods and Data

In winter 2018, all UMass Amherst faculty were invited to participate in a *Faculty Climate Survey* by the UMass ADVANCE team. The study's stated aim: to better understand faculty experiences at UMass.

Survey questions center around three themes: community inclusion, research collaboration, and departmental decision-making. The survey asks about faculty research, teaching, and service; the culture and decision-making style within departments and programs; quality of faculty mentoring; job satisfaction; and balance between work and personal life. Ultimately, the survey is designed to understand if there is equity in the distribution of resources to promote faculty success and inclusion. What is going well for faculty? What areas need improvement?

Survey Procedures

The online survey was conducted from December 2018 to February 2019 via Qualtrics. Faculty were invited to participate in the survey via email. Initial recruitment emails included a personal endorsement of the importance of the survey from the Provost, and Associate Chancellor of Equity & Inclusion with the University Chancellor. Efforts to maximize survey participation included two follow-up email reminders: one month later, a follow-up email reminder was sent by College Deans, and then again, after another month, Deans sent a second and final reminder. In total, the survey was live for 8 weeks, and faculty could exit the survey and return to continue the survey any time during this window.

In addition to the set of core questions mentioned above, the survey asks items about social identity including gender, ethnicity, race, nationality, rank, and family status. The survey also includes open-ended questions to capture additional factors shaping research collaboration, inclusion, and decision-making. The survey took 10 minutes on average to complete.

Confidentiality was ensured for faculty. Only aggregated summaries of findings are shared with university leaders, department chairs, and faculty. Faculty had the option to provide their email address at the conclusion of the survey to enter a prize drawing; this list of email addresses for the prize drawing were collected and stored on a separate spreadsheet. All research procedures were approved by the Institutional Review Board for Human Subjects Research at University of Massachusetts Amherst.

Who are our Survey Respondents?

In total, 655 UMass faculty completed the survey, for a response rate of 46%. Because NSF ADVANCE focuses on equity in STEM, we primarily report on the data from the **419 UMass faculty respondents from 32 STEM departments** in the College of Engineering, College of Information and Computer Sciences, College of Natural Sciences, or College of Social and Behavioral Sciences, or in the departments of Management in the Isenberg School of Management and Linguistics in the College of Humanities and Fine Arts.⁸ We compare STEM faculty responses to non-STEM faculty at the end of this report. The response rate for STEM faculty is 58%, which is an extremely high response rate compared to other faculty surveys that typically yield a response rate of approximately 20-30%.⁹⁻¹⁰

Descriptive statistics for survey respondents are summarized in Table 1. Amongst the STEM faculty respondents, 48.7% are men (n = 204), 43% are women (n = 180), and 0.2% are gender non-binary (n = 1). In terms of race and ethnicity, 67.3% are White (n = 282), 9.3% Asian or Pacific Islander (n = 39), 5.7%

are Hispanic or Latinx (n = 24), 2.4% African American or Black (n = 10), 1% multiracial (n = 4), 0.2% Native American or American Indian (n=1), and 3% other (n = 12). Taken together, 9.3% (n=39) of the sample identify as members of underrepresented racial/ethnic minority groups (Black, Hispanic or Latinx, Native American or American Indian, or multiracial). 69.2% (n = 290) of respondents were born in the United States, compared to 25.3% (n = 106) born outside of the US.

In terms of rank, 42.2% of survey respondents are Professors (n = 177), 17.9% are Associate professors (n = 75), 15.5% are Assistant professors (n = 65), and 19.1% are non-tenure-track faculty (n = 80, including adjuncts, lecturers, research professors and extension professors). In terms of sexual orientation, 10.3% of respondents identify as Lesbian, Gay, Bisexual, or Queer (n = 43) and 75.2% heterosexual (n = 315). No respondent identifies as transgender. In terms of caregiving status, 46.8% of respondents (n = 196) report that they are a primary caregiver or co-caregiver for either children or other adult family members, while 45.6% (n = 191) are not primary caregivers.

TABLE 1: Sample Demographic Information

	<i>N</i>	<i>%</i>
Gender		
Men	204	48.7%
Women	180	43%
Non-binary	1	0.2%
Not reported	34	8.1%
Race/Ethnicity		
White	282	67.3%
Asian or Pacific Islander	39	9.3%
Hispanic or Latinx	24	5.7%
Black or African American	10	2.4%
Multiracial	4	1%
Native American or American Indian	1	0.2%
Other/Not reported	59	14.1%
Nationality		
U.S.-born	290	69.2%
Foreign-born	106	25.3%
Not reported	23	5.5%
Rank		
Professor	177	42.2%
Associate professor	75	17.9%
Assistant professor	65	15.5%
Non-tenure-track faculty	80	19.1%
Not reported	22	5.3%
Sexual Orientation		
Heterosexual	315	75.2%
LGBQ ¹¹	43	10.3%
Not reported	61	14.5%
Caregiving Status		
Primary caregivers	196	46.8%
Not primary caregivers	191	45.6%
Not reported	32	7.6%

In comparing survey participants to the target population demographics, men are slightly underrepresented in the survey (48.7% of respondents versus 54.5% of tenure-system faculty). With regard to race, survey participants correspond closely to the population. Professors are overrepresented among survey participants (42.2% percent of respondents versus 32.4%).¹²

Our Focus: Collaboration, Inclusion & Decision-Making

The subsets of question that are the focus of this report were chosen based on their relationship to UMass ADVANCE goals and intervention efforts. A summary of included measures and descriptive statistics including means and standard deviations are included in Table 2. Unless otherwise noted, measures were reported on 5-point Likert scales and, for the purpose of this report, were recoded as dummy variables (0=no, 1=yes). For a complete list of survey questions, please see the Appendix.

TABLE 2: Descriptive Statistics of Key Measures

	<i>N</i>	<i>Mean</i>	<i>SD</i>
Collaboration			
Enjoy collaboration	382	.86	.35
Often have collaboration opportunities with UMass faculty	394	.40	.49
Satisfied with amount of collaboration opportunities at UMass	396	.55	.50
Satisfied with collaboration resources			
Internal grants	383	.20	.40
Access to graduate students	396	.37	.48
Factors facilitating collaborations with UMass colleagues			
Research topic similarity	419	.71	.45
Research complementarity	419	.74	.44
External funding	419	.44	.50
Shared internal funding	419	.20	.40
Physical resources on campus	419	.31	.46
Graduate student in common	419	.39	.49
Physical proximity of offices/labs	419	.39	.49
Physical proximity of social spaces	419	.11	.31
Teaching	419	.14	.35
Shared committee service	419	.12	.33
Social connections	419	.28	.45
Referral by someone else	419	.18	.38
Something else	419	.09	.28
Inclusive Community			
Feel connected to department	417	.62	.49
Feel accepted by colleagues in department	417	.71	.45
Feel valued for research	398	.53	.50
Feel valued for teaching	406	.59	.49
Feel valued for service	412	.59	.49
Satisfied with professional interactions	414	.63	.49
Satisfied with social interactions	410	.53	.50
Feel demands associated with their identity group have positive effect on their pursuit of career goals	392	.20	.40
Feel demands associated with their identity group have negative effect on their pursuit of career goals	392	.41	.49
Rating of campus climate (average score) ¹³	416	.62	.38

Contentious vs. collegial	416	.69	.47
Disrespectful vs. respectful	416	.72	.45
Individualistic vs. collaborative	413	.50	.50
Competitive vs. cooperative	415	.62	.45
Unsupportive vs. supportive	416	.59	.46
Inequitable vs. equitable	413	.55	.50
Unfair vs. fair	412	.62	.49
Isolating vs. inclusive	415	.57	.50
Believe men and women faculty receive equal treatment in department/program	359	.52	.50
Believe white and racial minority faculty receive equal treatment in department/program	280	.62	.49
Believe domestic and immigrant faculty receive equal treatment in department/program	286	.75	.43
Decision-Making			
Department chair/head consults my opinion in decision-making	371	.90	.30
Department chair/head values my opinion in decision-making	372	.60	.49
Often communicate concerns about decisions to chair/head	380	.61	.49
Colleagues value my opinion in departmental decision-making	369	.53	.50
Departmental decision-making processes are fair	411	.69	.46
Departmental decision-making processes are transparent	389	.60	.49
Tenure & promotion criteria and decision-making process is clear	387	.60	.49
Tenure & promotion criteria are consistently applied	229	.65	.48
Promotion to Professor criteria and decision-making process is clear	274	.41	.49
Promotion to Professor criteria are consistently applied	173	.63	.48
Frequently asked to take on departmental leadership roles	404	.48	.50

Data Analysis

To test whether significant relationships exist between faculty's social backgrounds and their collaboration, inclusion, and decision-making experiences, we conduct chi-square tests of independence. Chi-square tests are appropriate for categorical variables with no numerical value (such as gender or race). All of the measures included in this report are categorical or are ordinal-scale measures that we converted to categorical, dummy measures to streamline the presentation of findings to campus and community stakeholders (for more information, see Appendix).

First, we conducted crosstabulations (contingency tables) of gender and measures of collaboration, inclusion, and decision-making. The chi-square statistic assesses whether the observed patterns existing in the crosstabulations are due to random variation or whether patterns exist in the population. Then, for intersectional analyses, we created nominal measures to capture two social identities in a single variable. For example, we capture gender and race in one variable with six categories, such that 1 = white men, 2 = white women, 3 = Asian men, 4 = Asian women, 5 = men from URM groups, and 6 = women from URM groups. This approach allows us to compare groups intersectionally while maintaining large enough group sizes to conduct meaningful statistical tests.

We report p-values for each chi-square test in the figures below. All of the findings reported in this survey are statistically significant. When interpreting the charts, statistical significance indicates that the patterns in the table are not due to random variation. The goal of the chi-square is not to say, for example, that women from underrepresented racial minority groups and white women are different.

Rather, the goal is to say that the patterns we see among the six gender-race groups are unlikely due to random variation.

Intersectionality

Intersectional theory notes that gender intersects with statuses like race, ethnicity, nationality, class, sexuality, disability, and age to affect people's lived experiences, including experiences in academic settings.^{14,15,16} While ADVANCE focuses on developing systemic, sustainable approaches to address gender disparities in the sciences, this includes dynamics at the intersection of gender and race, and other identities like sexuality, nationality, and rank. Our report and findings reflect this commitment to intersectionality.

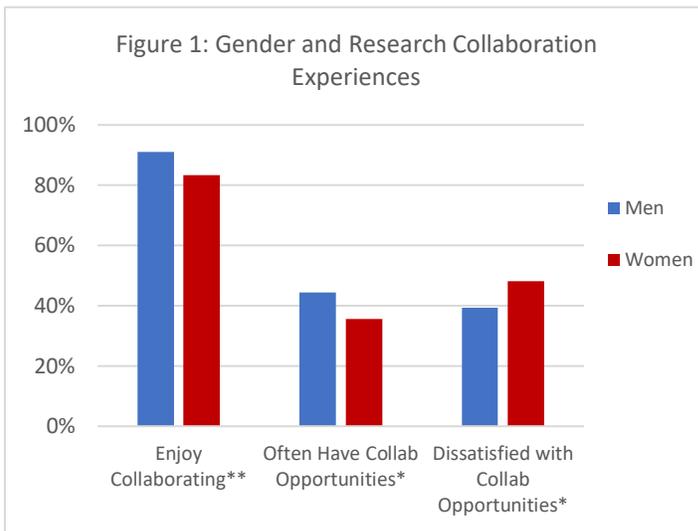
First, we outline key findings among STEM faculty by gender in collaboration, inclusion, and decision-making. Then, we turn to intersectional analyses of the data that examine these three areas by gender and race, nationality, sexuality, and rank. With research pointing to the differential impacts of caregiving on academic careers, particularly for women, we also examine the data by gender and caregiving status.¹⁷ Finally, we summarize data comparing STEM and non-STEM faculty at UMass.

Unless otherwise noted, all between-group differences discussed in this report are statistically significant, with ***= $p \leq .001$, **= $p \leq .05$, and *= $p \leq .01$.

Key Survey Findings

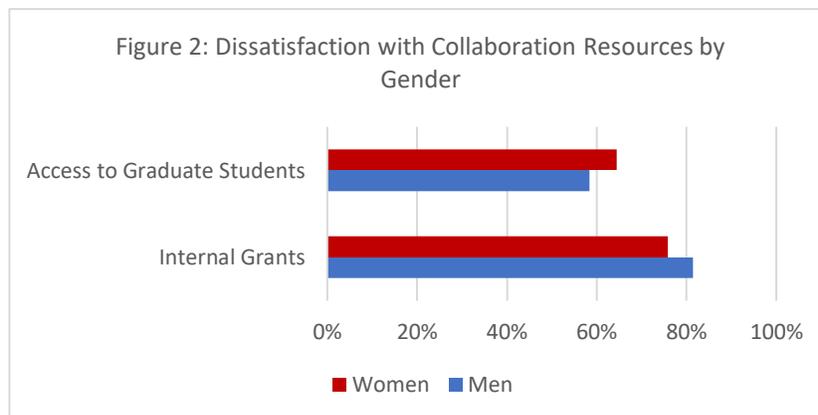
Research Collaboration

Research collaboration, including on grant proposals, papers, patents, or other formal and informal outputs, is central to much 21st century STEM research, and positively related to productivity, funding, and professional development. Yet, do all STEM faculty members at UMass have similar and positive experiences with and access to collaboration?



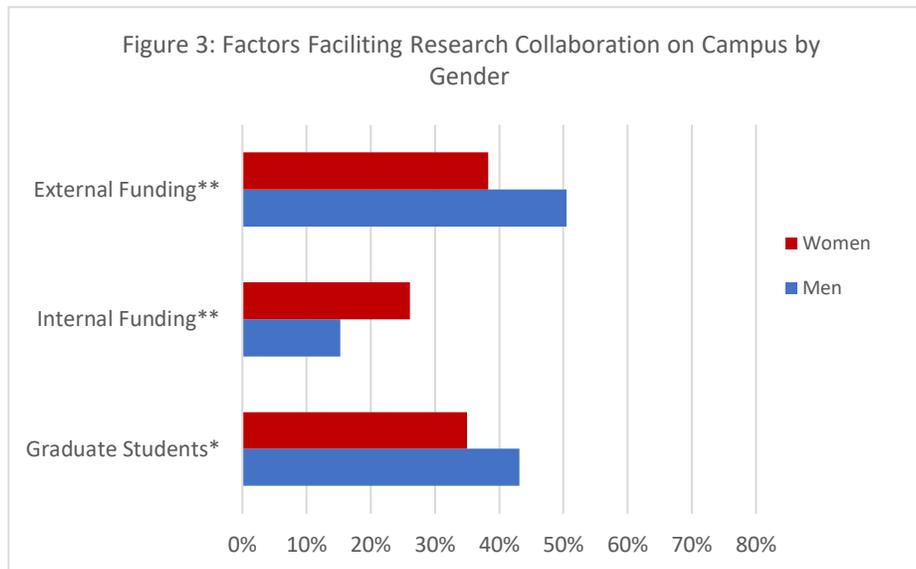
UMass STEM faculty enjoy collaborating with others on their research. Figure 1 shows that **both men and women enjoy collaborating** with UMass colleagues, but there is an extraordinary mismatch between how much they enjoy collaborating and their opportunities to collaborate on campus. There are gender differences in how faculty experience and have opportunities to collaborate. **Women report having fewer opportunities to collaborate**, and are **less satisfied** with collaboration opportunities.

The survey also asked whether or not faculty are satisfied with resources for collaboration. There are no significant gender differences in satisfaction levels; however, **both men and women are extremely dissatisfied** with opportunities for **internal grants** to fund collaborative research and with **access to graduate students**. However, women are slightly less dissatisfied with access to internal grants than men.



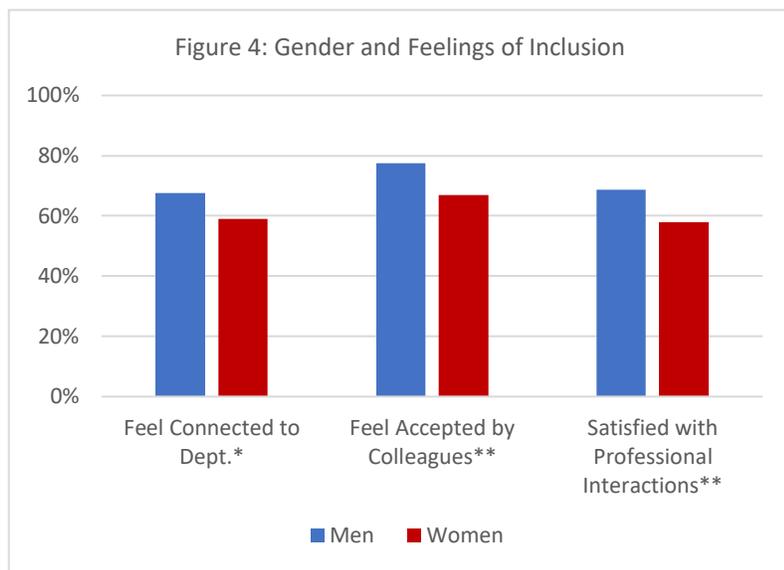
We asked UMass faculty to identify factors that facilitate their research collaborations. On a number of factors, there are no significant gender differences. For example, both men and women across ranks find that collaborations are facilitated by **shared research topics** (71%) or **complementary research interests** (74%). Physical proximity of offices and lab spaces (41%) or social spaces (11%) play smaller roles. Social connections (28%) and referral by colleagues (18%) also do not appear to differ by gender. Shared teaching (14%) or committee service (13%) also do not differ by gender.

Yet, as shown in Figure 3, some factors appear to operate differently by gender. For example, **men are significantly more likely to see external funding as facilitating collaborations**. This effect is driven by senior men for whom external grants are most likely to facilitate collaboration. **Shared internal funding appears to play a key role in facilitating women’s collaboration**, which may result in women noting greater satisfaction with internal grants. Men are marginally more likely to see graduate students as facilitating collaboration, an interesting finding given that women also reported less access to graduate students.



Inclusive Community

Inclusion refers to feeling welcome and part of the UMass community, and creating inclusive department environments is critical to retaining and supporting the success of diverse faculty members. Yet, do men and women STEM faculty at the university have similar experiences regarding inclusion?

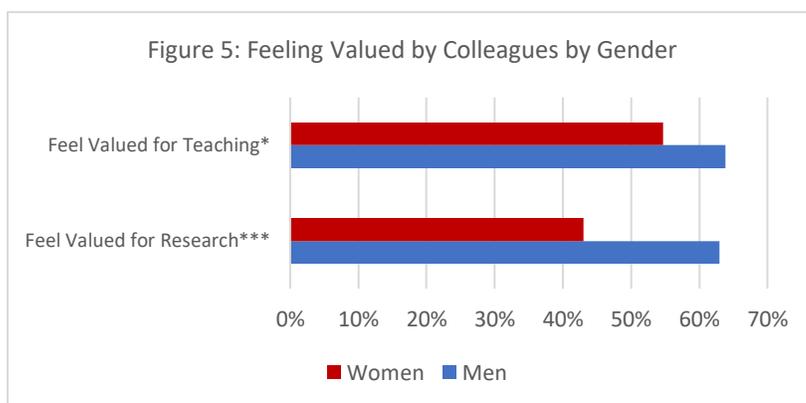


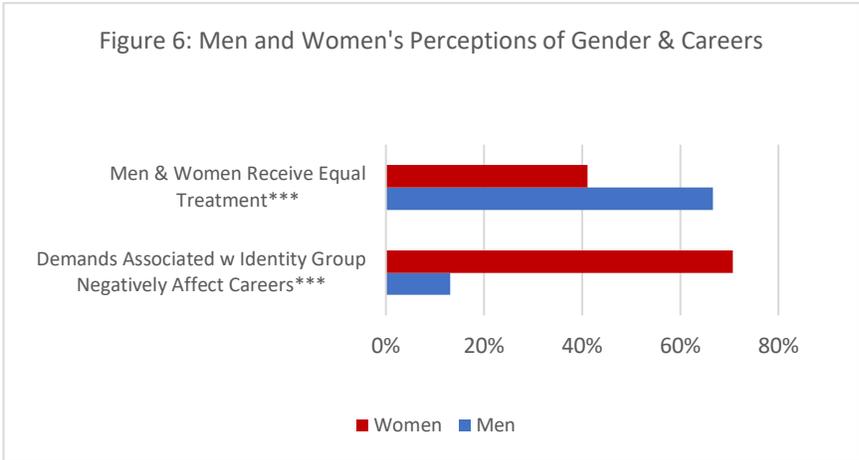
Key to inclusion is feeling connected to and accepted by colleagues. As Figure 4 suggests, UMass STEM faculty typically feel connected to their departments and accepted by colleagues. However, gender shapes these feelings of inclusion: **women feel less connected to departments compared to men, and less accepted by their colleagues.**

Another indicator of inclusion is feeling satisfied with professional interactions in a person's department. While STEM faculty on average report feeling somewhere between "neither satisfied or

dissatisfied" and "somewhat satisfied" on this measure, **women tend to feel less satisfied with their professional interactions than men.**

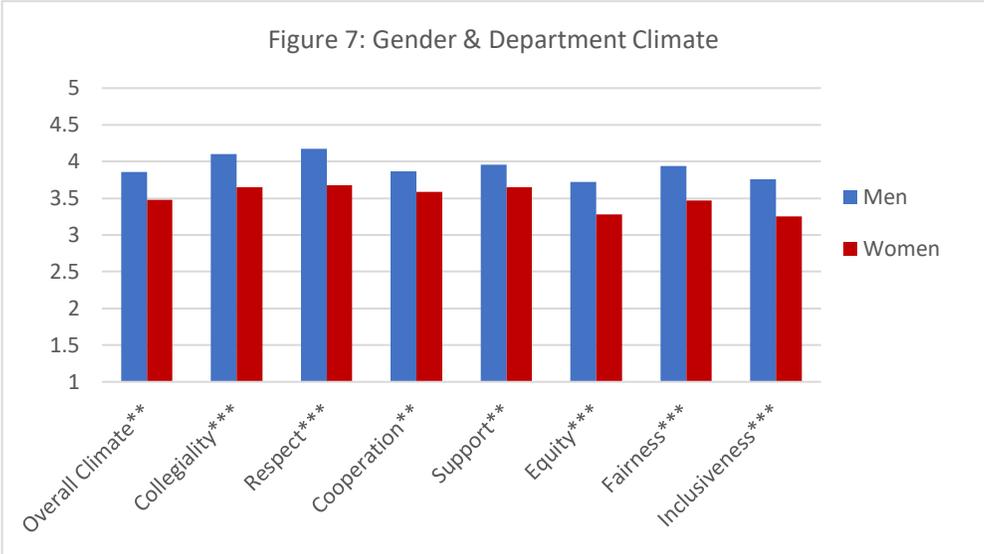
UMass STEM faculty members report, on average, feeling "somewhat valued" to "valued" by their departmental colleagues on a variety of measures, but many faculty members do not feel "very valued" for their work. The variation on these measures by gender is important to recognize, as reported in Figure 5. Men generally feel equally valued for their teaching and research. Women report feeling more valued for their teaching than research. **However, women feel substantially less valued than men for their research and are marginally less likely to feel valued for their teaching** compared to men. The survey also asked whether or not faculty feel valued for their service. There are no significant gender differences on this measure; however, the trend suggests that women feel slightly less valued than men.





We asked UMass faculty how gender might impact their careers. Women and men perceive the effect of gender differently; as shown in Figure 6, **men are significantly more likely to report that women and men faculty receive equal treatment in their department.** Additionally, when asked whether demands or expectations associated with their identity group have had an effect on their pursuit

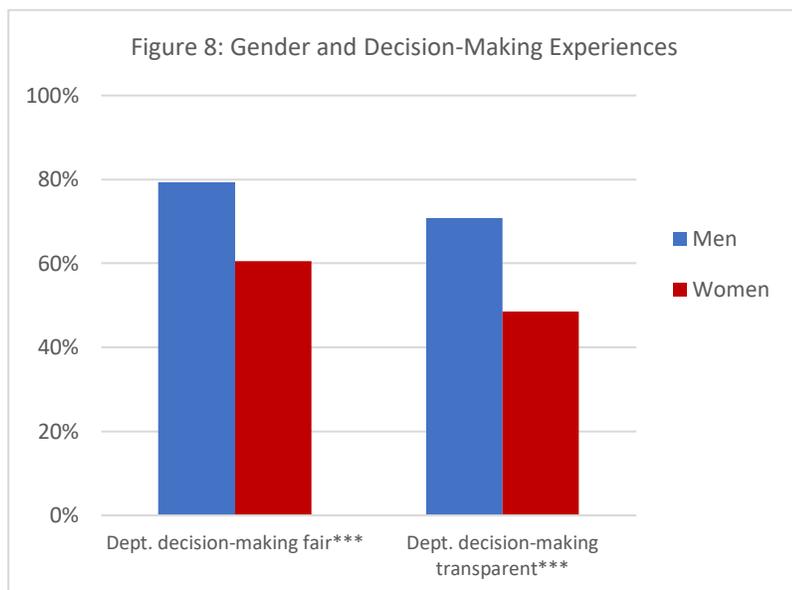
of career goals, **women are substantially more likely than men to report experiencing negative effects on careers.**



The survey asked faculty to rate their departments on a series of climate dimensions. On average, men and women tend to rate their departments somewhat positively, but again there are important gendered patterns in the data. As Figure 7 shows, women on average rate their departments lower than men on a number of climate measures, signaling that **women STEM faculty find their departments to be less collegial, respectful, cooperative, supportive, equitable, fair, and inclusive than colleagues who are men.**

Decision-Making

Shared decision-making refers to faculty members having opportunities to have their voices heard as their department make decisions, including key personnel decisions such as promotion and tenure. Transparent governance is central to equity and inclusion, but do all STEM faculty members at the university have similar and positive experiences regarding decision-making?

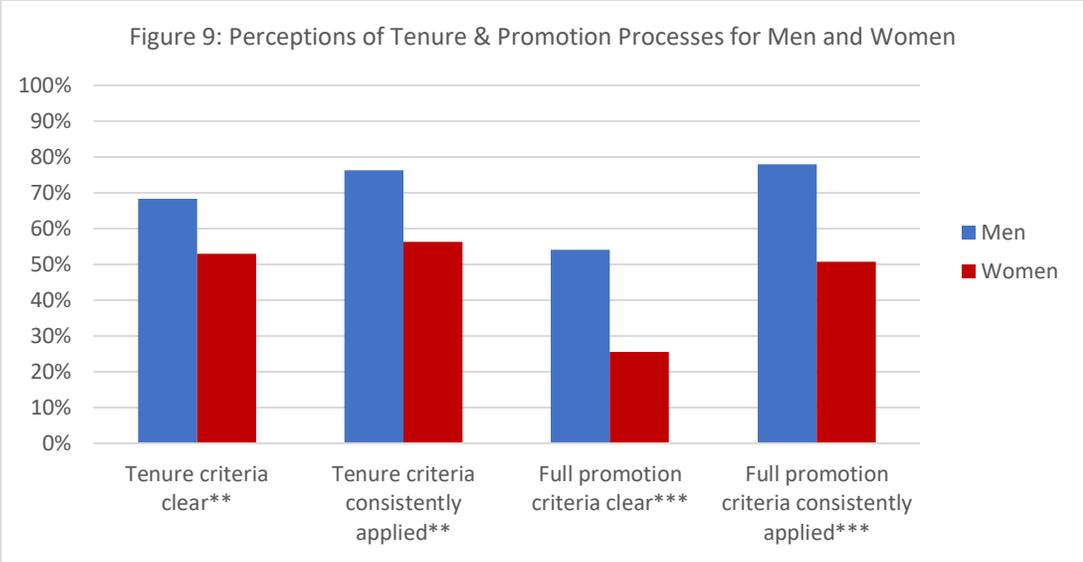


Perceptions of whether departmental decision-making processes are fair and transparent appear in Figure 8. While most (68.8%) STEM faculty report that departmental decision-making processes are fair, fewer faculty (60%) report that these processes are transparent.

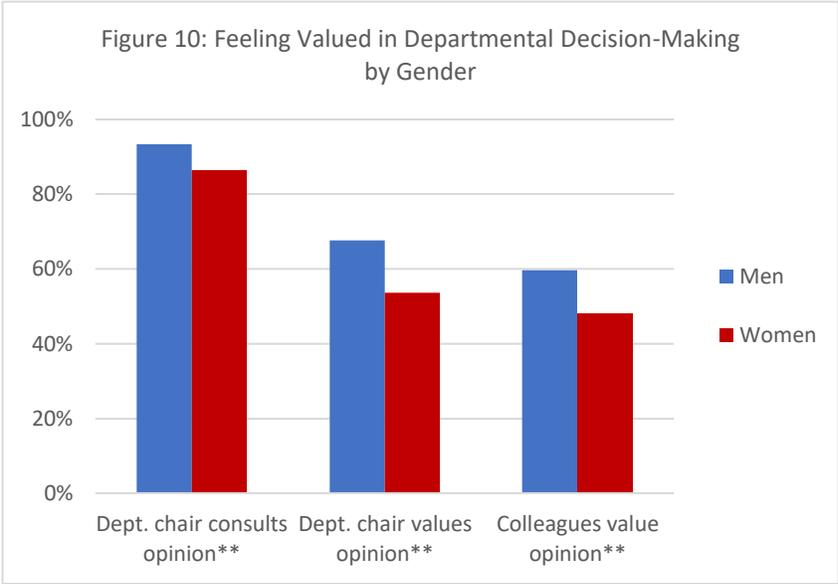
However, gender shapes these perceptions: just **60% of women STEM faculty report feeling decision-making is fair**, as compared to 79.7% of men, and only **48.8% of women report decision-making to be transparent**, compared to 71.3% of men.

The survey asked faculty about specific personnel procedures in their departments and programs, including tenure and promotion and promotion to Professor. UMass STEM faculty members report, on average, feeling “moderately clear” to “quite clear” on tenure criteria, and that those criteria are “usually” applied consistently. They also, on average, report feeling somewhat less certain on criteria for promotion to Professor, though they also think that those criteria are “usually” applied consistently.

As shown in Figure 9, there are significant variations by gender in these perceptions. **Women STEM faculty are less likely than men to have clarity on the criteria for tenure and promotion**, and they are **less confident that these criteria are applied consistently**. Among tenured faculty, **women are very unclear on criteria for promotion to Professor**, and they are much less likely than men to believe these criteria are applied consistently. Taken together, these findings suggest that gender plays an important role in how informed faculty feel about campus personnel procedures.



Relationships with department chairs and heads, and with departmental colleagues, may provide another window into how engaged faculty members feel with decision-making. Figure 10 points out that **women STEM faculty are less likely than men to report that their chairs consult them in making decisions**. Women also feel as though **their opinions are valued less** than men by both their department heads and departmental colleagues in decision-making processes.



Intersectional Analyses

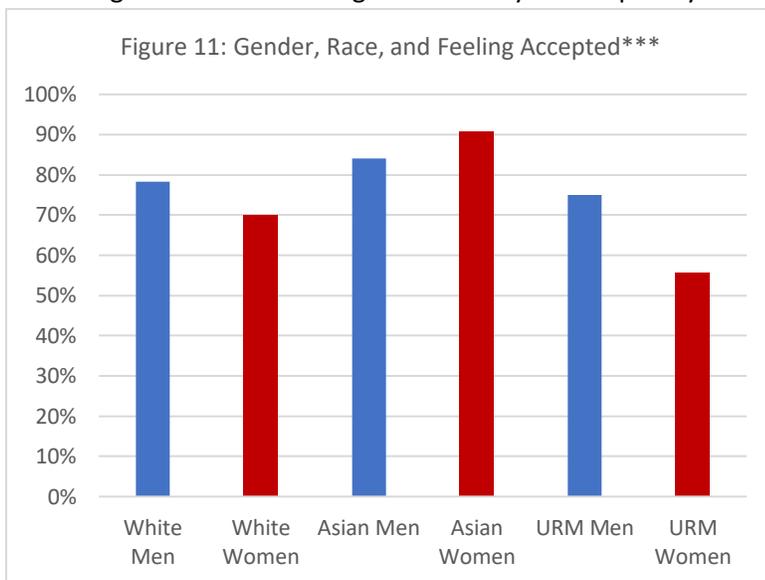
Gender and Race

In this section, we focus on patterns among STEM faculty by **race and gender**. We explore whether and how race and gender affect how STEM faculty experience inclusion, shared decision-making, and research collaboration. UMass ADVANCE interventions aim to develop systemic and sustainable approaches to address faculty disparities at the intersection of gender and race, including addressing the experiences of STEM faculty of color to support their inclusion and retention. White STEM faculty were more likely to complete the survey than other groups; nonetheless, the findings reveal significant differences among faculty by gender and race. As the findings indicate, **interventions must foster inclusion specifically for women faculty in STEM from underrepresented racial minority (URM) groups.**

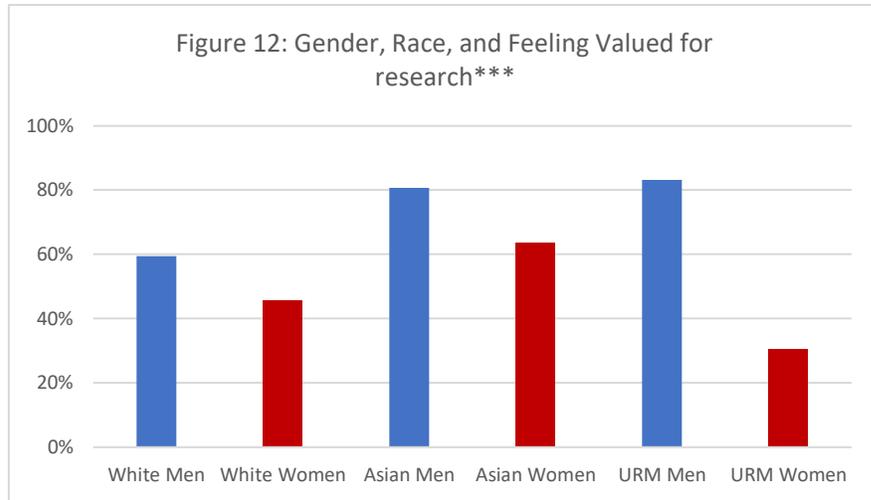
Women faculty of color in STEM, but *particularly* women from URM groups, experience unique barriers to inclusive communities, decision-making, and research collaboration. On many survey measures, women from URM groups score lower than both women from other racial groups and men from URM groups, suggesting that they feel the **least included** on the UMass campus. The negative campus climate for women faculty of color not only impedes their careers, but also means that the university community loses out on their voices and contributions.

Faculty are grouped by white men (n=152), white women (n=127), Asian men (n=26), Asian women (n=11), men from URM groups (n=12) and women from URM groups (n=27). Underrepresented racial minority includes the categories “American Indian or Alaskan Native”, “Black”, “Hispanic or Latino origin”, and anyone who chose “Multi-Racial” or “Other” and provided a response indicating they were a member of a traditionally underrepresented community.

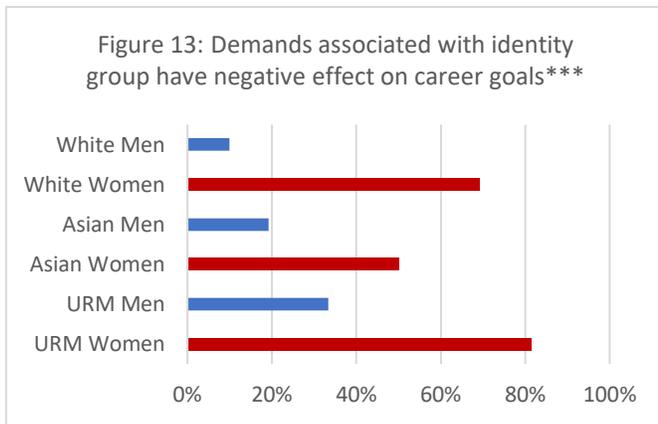
Feelings of inclusion among STEM faculty are shaped by race and gender. As Figures 11 and 12 show,



men and Asian faculty are most likely to report feeling accepted by colleagues and valued for research. **Women from URM groups and white women feel the least accepted by colleagues and the least valued for their research.** Figure 12 shows that women from URM groups feel especially undervalued for research, with only 30% feeling valued compared to 83% of men from URM groups. These findings match racial and gender stereotypes of the “ideal” scientist, and suggest that gender and race intersect to cloud perceptions of Black and Brown women’s research excellence on campus.



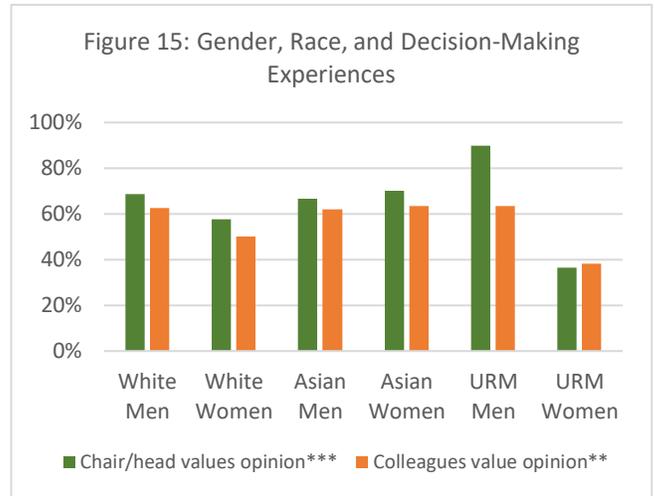
Similarly, Figure 13 shows that white and Asian men are least likely to report demands associated with their identity groups have had a negative effect on their careers. **Women across racial groups are more likely to report demands associated with their identity groups have had *negative effects* on career goals.** Amongst women faculty, **women from URM groups are the most likely to report that demands associated with an identity group has had a negative effect on their career goals**, followed by white and then Asian women.



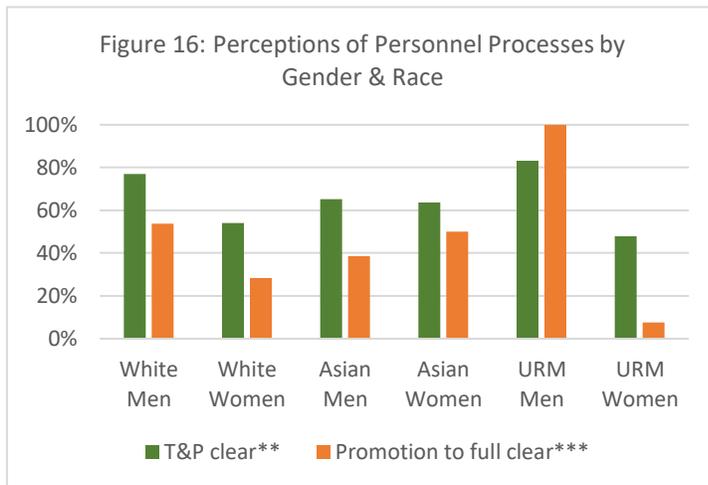
As Figure 14 points out, women are also less likely than men to perceive men and women as receiving equal treatment in their departments, or that white and racial minority faculty receive equal treatment. **Women from URM groups are most likely among all groups to perceive their departments as unequal**, and the vast majority of them believe that both women and racial minorities receive worse treatment than men and white faculty. White men are the most likely to report that all groups receive equal treatment in departments.



In the context of decision-making, STEM faculty generally report feeling that their opinions are valued by chairs/heads and colleagues. However, as Figure 15 shows, **women faculty from URM groups feel significantly less valued than other groups in decision-making.** For example, in comparing women and men from URM groups, men feel highly valued by their department chairs, with 90% feeling valued, compared to only 36.4% of women. White and Asian women are over 1.5x more likely than Black and Brown women to report feeling valued by their chair.

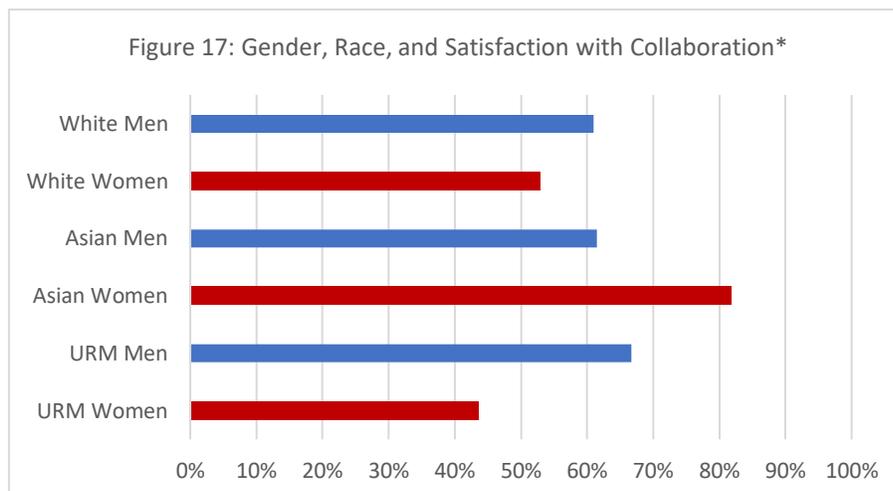


The data on personnel decisions are especially troubling: men across racial groups are more likely to report that tenure & promotion processes are clear than women, as indicated in Figure 16.

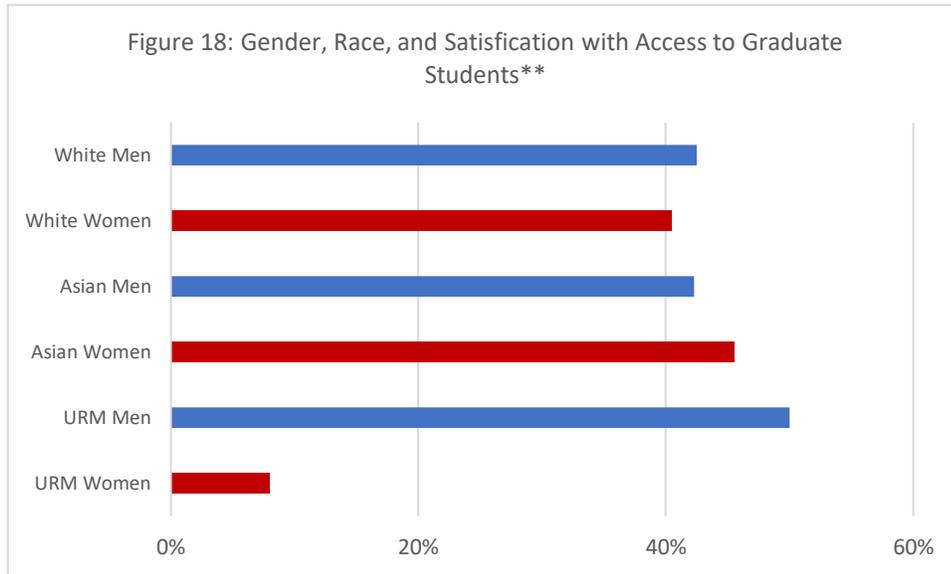


Fewer than half of women faculty from URM groups and about half of white women STEM faculty feel that tenure & promotion processes are clear. Only 7.7% of women Associate professors and Professors from URM groups believe that promotion to Professor processes are clear. Men from URM groups and white men tenured faculty are the most likely to report that promotion to Professor processes are clear (Asian men are less clear on promotion to Professor). To improve representation of women of color in the upper-most ranks of departments and the university, faculty mentorship must adequately address these issues.

On average, UMass STEM faculty report enjoying collaboration very much; however, collaboration opportunities vary by gender and race. As Figure 17 shows, **women STEM faculty from URM groups are the least satisfied with research collaboration opportunities** on campus, followed by white women.



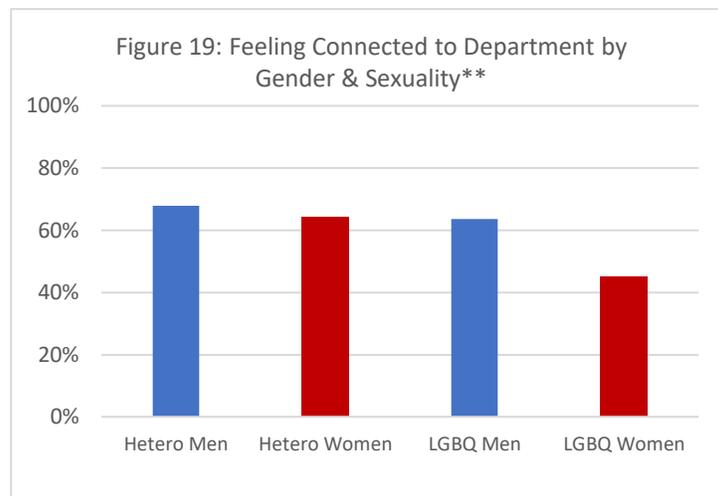
Shown in Figure 18, women from URM groups are also **deeply unsatisfied** with access to resources to collaborate, including access to graduate students, with only **8% reporting being satisfied**. Men from URM groups are the most satisfied with access to graduate students of any group, suggesting the importance of looking at intersections of race *and* gender to understand faculty collaboration experiences. When asked which factors facilitate their collaborations, women from URM groups state that research topic similarity facilitates collaboration on campus more so than any other factors. This suggests the importance of connecting Black and Brown women to colleagues on campus over their shared research interests.



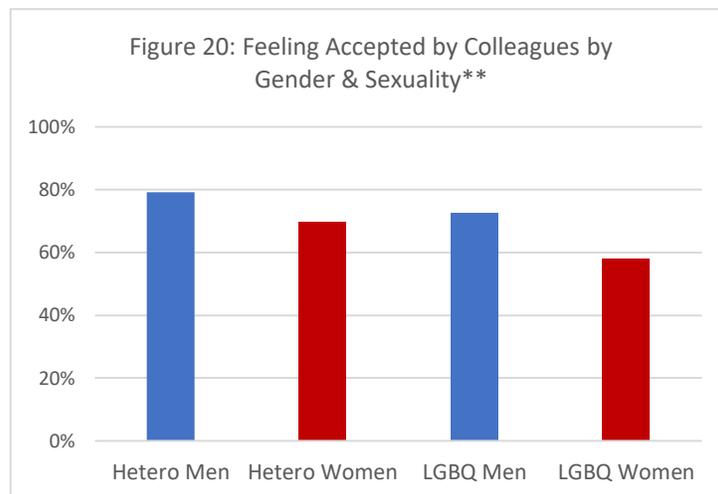
Gender and Sexuality

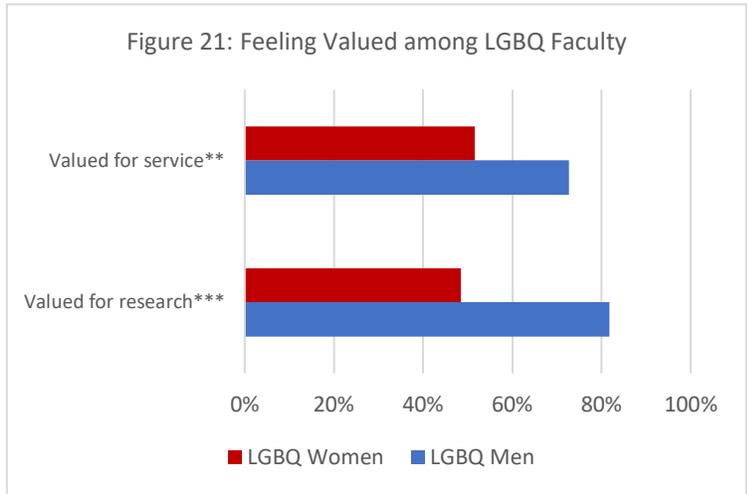
In this section, we focus on patterns among STEM faculty by **sexuality and gender**. We explore whether and how sexuality and gender affect how STEM faculty experience inclusion, shared decision-making, and research collaboration. UMass ADVANCE interventions aim to develop systemic and sustainable approaches to address faculty disparities at the intersection of gender and sexuality, including addressing the experiences of LGBTQ STEM faculty to support their inclusion and retention. As the findings indicate, **interventions must foster inclusion specifically for LGBTQ STEM faculty, particularly LGBTQ STEM women.**

10% of survey respondents identified as LGBTQ. As no respondents identified as transgender, faculty are grouped by LGBTQ men (n=11), LGBTQ women (n=31), heterosexual men (n=178), and heterosexual women (n=133).



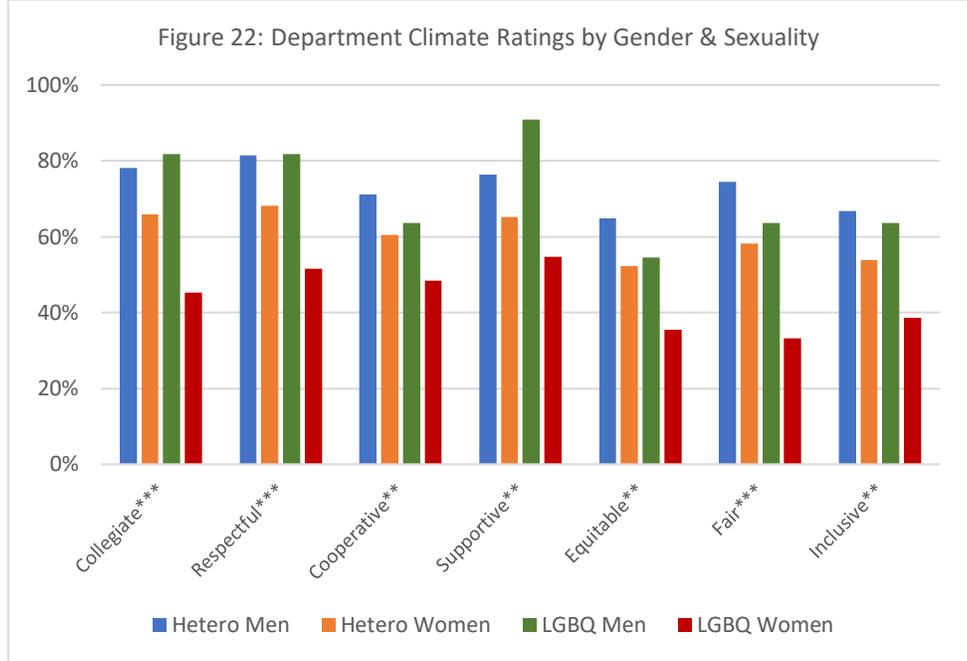
Feelings of inclusion among STEM faculty are shaped by sexuality and gender. As Figures 19 and 20 show, LGBTQ men feel only slightly less connected to their departments and accepted by colleagues than straight men. Straight women's feelings of connection and acceptance are comparable to LGBTQ men, but **LGBTQ women feel the least connected and accepted by colleagues**, with less than half of LGBTQ women feeling connected.





Similarly, Figure 21 shows that **among LGBQ faculty, women feel much less valued for their service and research than men.** LGBQ men feel extremely valued, especially for their research, but there is a gender divide in how LGBQ faculty experience their department communities.

This can also be shown in Figure 22, where LGBQ women rate their departments the lowest on nearly all climate measures. **LGBQ women find departments less collegial, respectful, cooperative, supportive, equitable, fair, and inclusive** than LGBQ men. LGBQ men are the most likely of any group to rate their departments as supportive, suggesting they may have more positive experiences in their departments than LGBQ women.



Departmental decision-making is also shaped by gender and sexuality for STEM faculty. As Figure 23 shows, neither LGBQ men nor women feel their opinions are valued by department chairs as much as heterosexual faculty, with **LGBQ women feeling the least valued in decision-making.** Similarly, **less than half of LGBQ women believe that department decision-making is fair or transparent,** as shown in Figure 24. LGBQ men are more similar to heterosexual men on these measures, with the majority generally finding decision-making to be fair and transparent.

Figure 23: Chair Values Opinion by Gender and Sexuality **

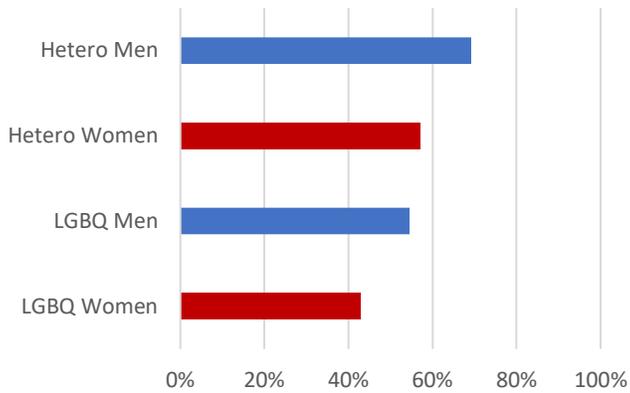
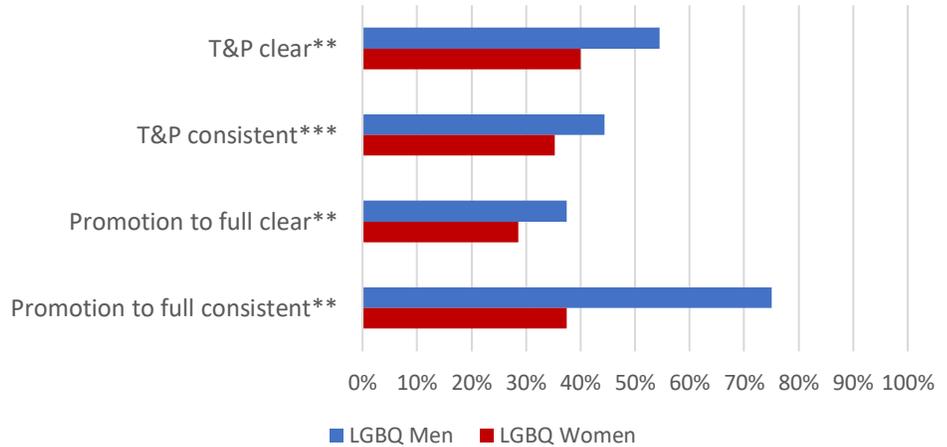


Figure 24: Gender, Sexuality, and Experiences with Decision-Making

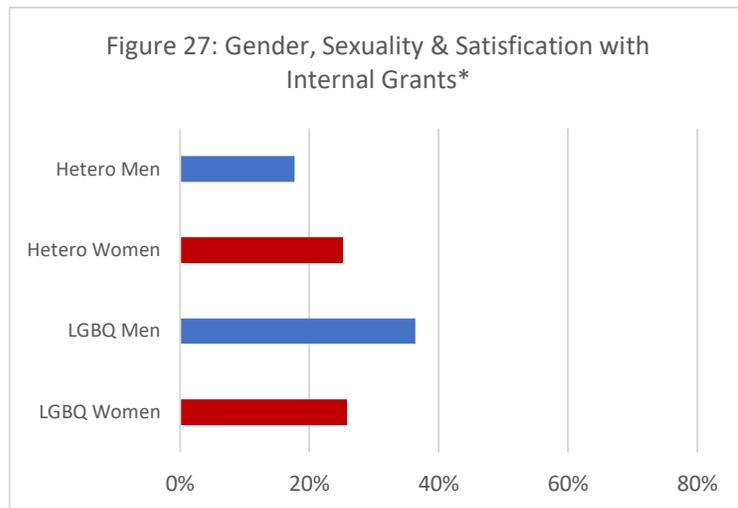
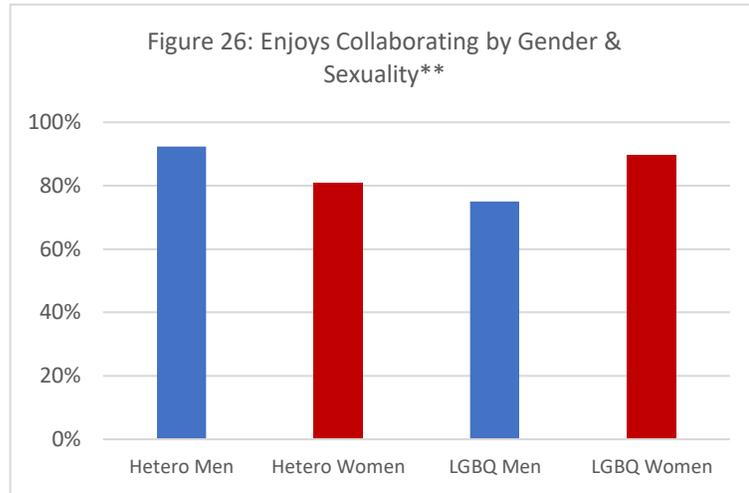


Findings on personnel decisions are especially troubling: LGBQ faculty are much less clear on tenure and promotion processes than heterosexual faculty – especially LGBQ women. As Figure 25 shows, **only 40% of LGBQ women feel that tenure and promotion is clear** and just about 35% feel T&P criteria are applied consistently. **Just over half of LGBQ men find tenure and promotion processes clear, and even fewer of them believe T&P criteria are applied consistently.** Among tenured faculty, **processes about promotion to Professor are even less clear among LGBQ faculty.** While LGBQ men are very likely to believe promotion to Professor criteria are applied consistently, **only 37.5% of LGBQ tenured women faculty believe promotion to Professor is consistent.** These findings suggest a disconnect in transparency surrounding personnel processes by gender and sexuality that often leaves LGBQ faculty, especially LGBQ women, in the dark.

Figure 25: Perceptions of Personnel Processes among LGBQ Faculty



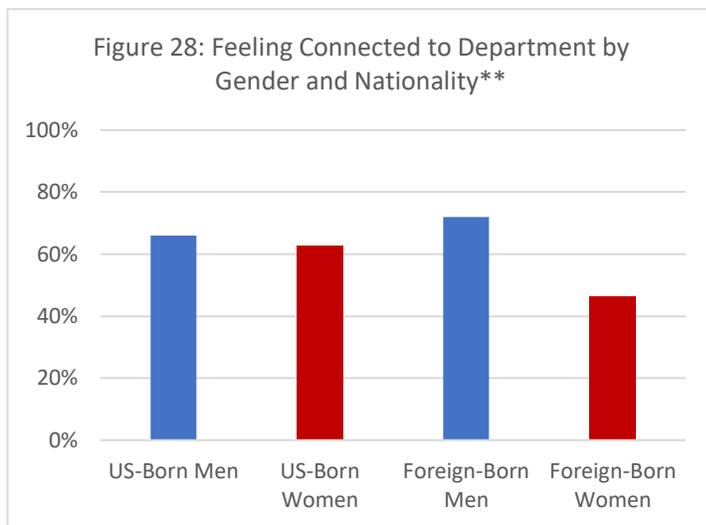
On average, heterosexual and LGBTQ STEM faculty report enjoying collaboration very much, as illustrated in Figure 26. However, as Figure 27 shows, all groups are dissatisfied with collaboration opportunities like internal grants. Overall, there are very few variations in research collaboration experiences among heterosexual and LGBTQ faculty that are significant, suggesting that sexuality might not shape research collaborations on campus as much as other social backgrounds.



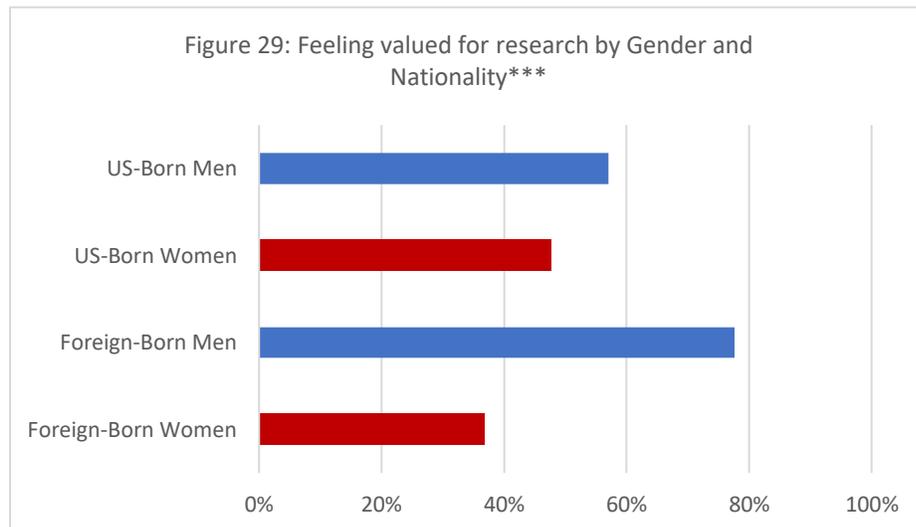
Gender and Nationality

In this section, we focus on patterns among STEM faculty by **nationality and gender**. We explore whether and how nationality and gender affect how STEM faculty experience inclusion, shared decision-making, and research collaboration. UMass ADVANCE interventions aim to develop systemic and sustainable approaches to address faculty disparities at the intersection of gender and nationality, including addressing the experiences of foreign-born STEM faculty to support their inclusion and retention. As the findings indicate, **interventions must foster inclusion specifically for foreign-born women STEM faculty**.

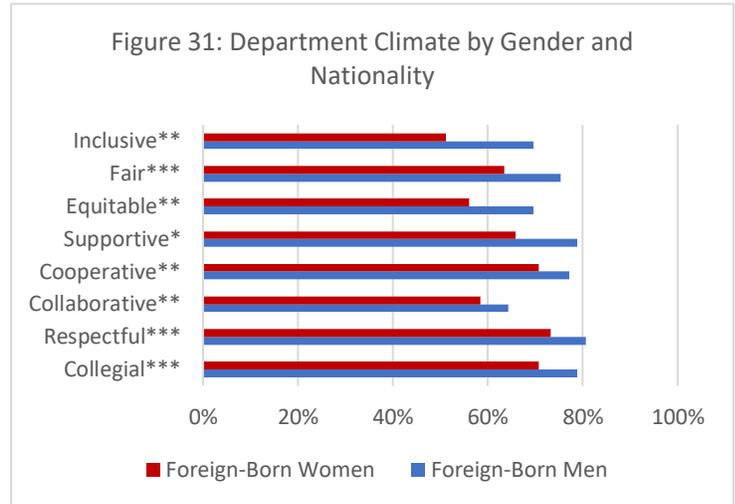
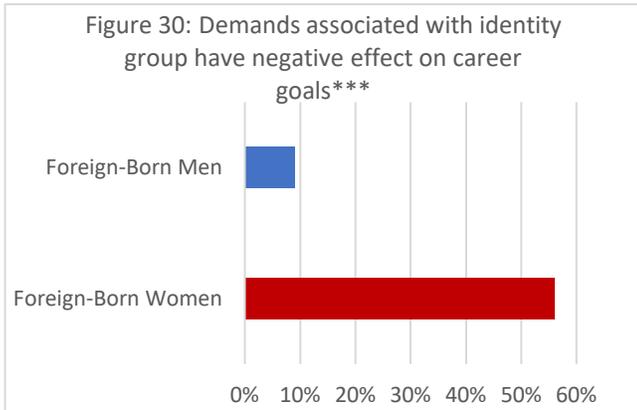
23.4% of survey respondents were born outside of the US. Faculty are grouped by US-born men (n=142), US-born women (n=132), foreign-born men (n=57), and foreign-born women (n=41).



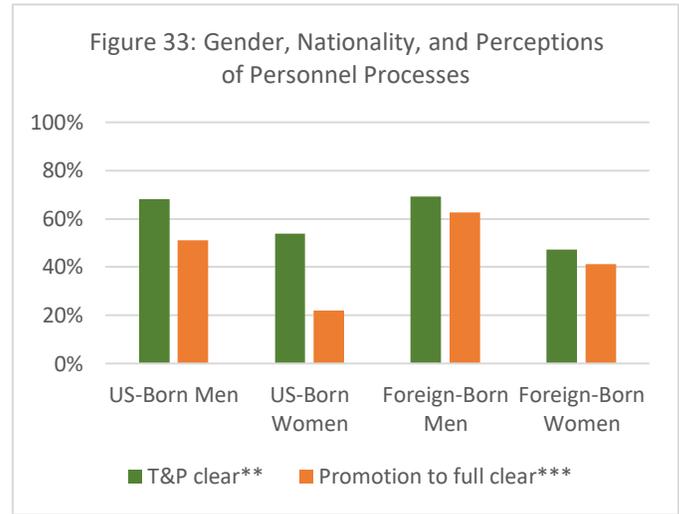
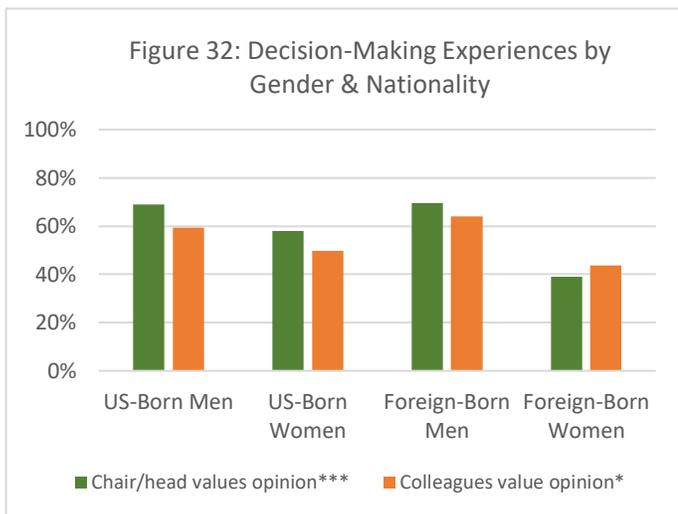
Feelings of inclusion among STEM faculty are shaped by nationality and gender. As Figures 28 and 29 show, foreign-born men are the most likely to feel connected to their departments and valued for research, but **foreign-born women feel the least connected and valued for their research**.



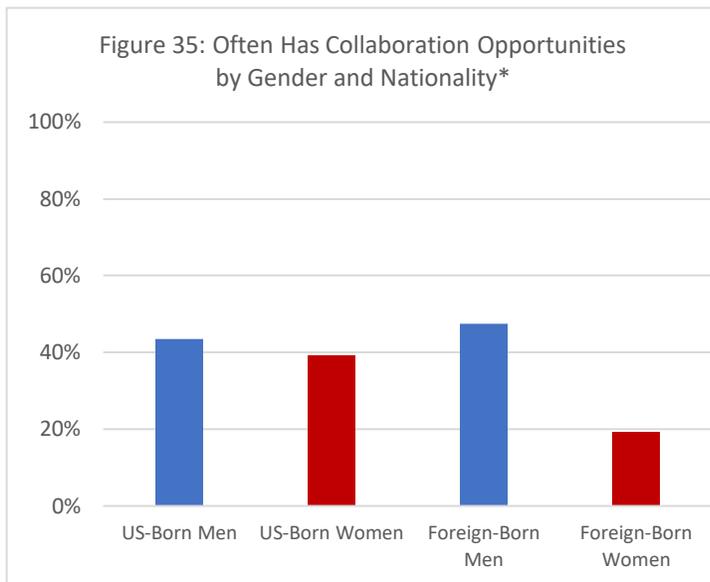
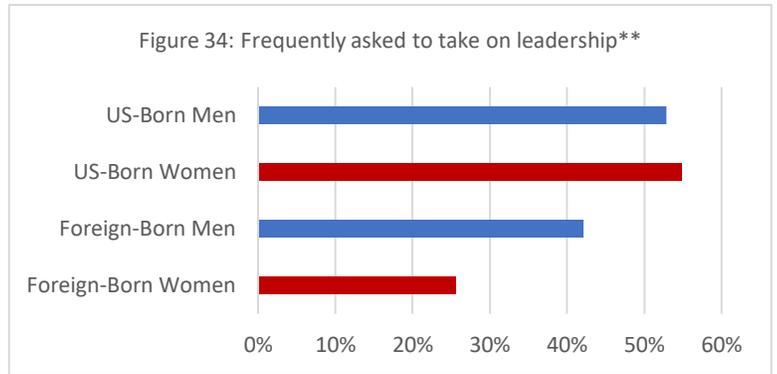
Similarly, Figure 30 shows that **foreign-born women are over six times as likely to report demands** associated with their identity groups have had negative effects on their careers. Comparing just foreign-born men and women faculty, Figure 31 reveals that foreign-born women are more likely to rate their departments lower than foreign-born men on most climate measures. **Foreign-born women find departments less collegial, respectful, collaborative, cooperative, supportive, equitable, fair, and inclusive than foreign-born men.**



In the context of decision-making, STEM faculty generally report feeling that their opinions are valued by chairs/heads – with the exception of foreign-born women faculty. As Figure 32 shows, **less than 40% of foreign-born women feel their chairs/heads value their opinions.** Foreign-born women also feel **less valued by their colleagues.** Both US-born and foreign-born men are more likely to report that tenure & promotion processes are clear than women, as indicated in Figure 33. **Fewer than half of foreign-born women feel that tenure & promotion is clear** and, among tenured faculty, that promotion to Professor is clear. These findings suggest that there is a disconnect in transparency surrounding personnel processes by gender and nationality that often leaves foreign-born women in the dark.



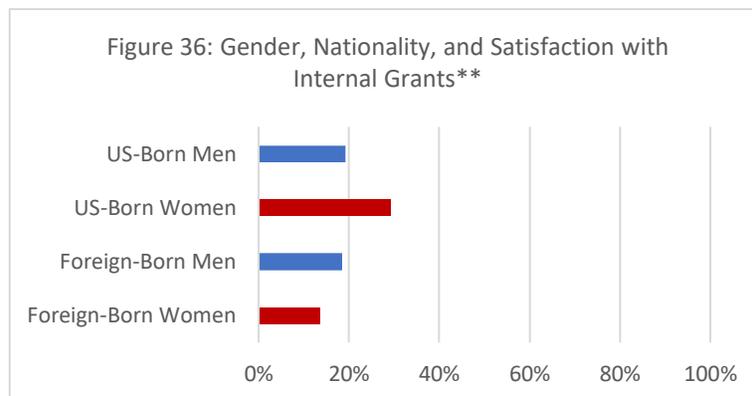
Foreign-born faculty are also less frequently asked to take on leadership roles in their department. As shown in Figure 34, only about 42% of foreign-born men and 26% of foreign-born women are often asked to serve in leadership.



On average, both US-born and foreign-born STEM faculty report enjoying collaboration very much; however, collaboration opportunities vary by gender and nationality. As Figure 35 shows, **foreign-born women STEM faculty have the fewest opportunities to collaborate on campus.**

They also have the **least collaboration opportunities**, followed by foreign-born men. As shown in Figure 36, Foreign-born women are **deeply unsatisfied** with access to internal grants to support their collaborative research, with only **13.5% reporting being satisfied**. Foreign-born

men have the most opportunities to collaborate on campus, again suggesting that foreign-born women faculty have distinct experiences on campus that must be addressed.

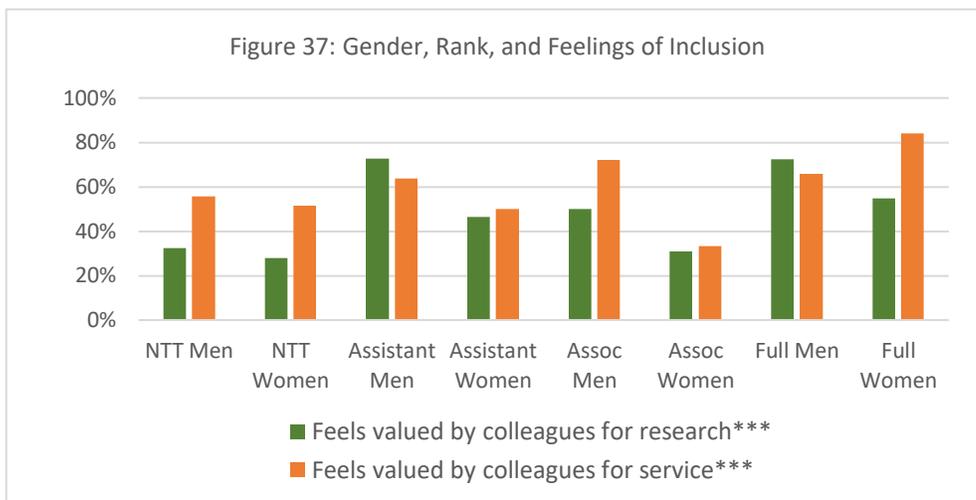


Gender and Rank

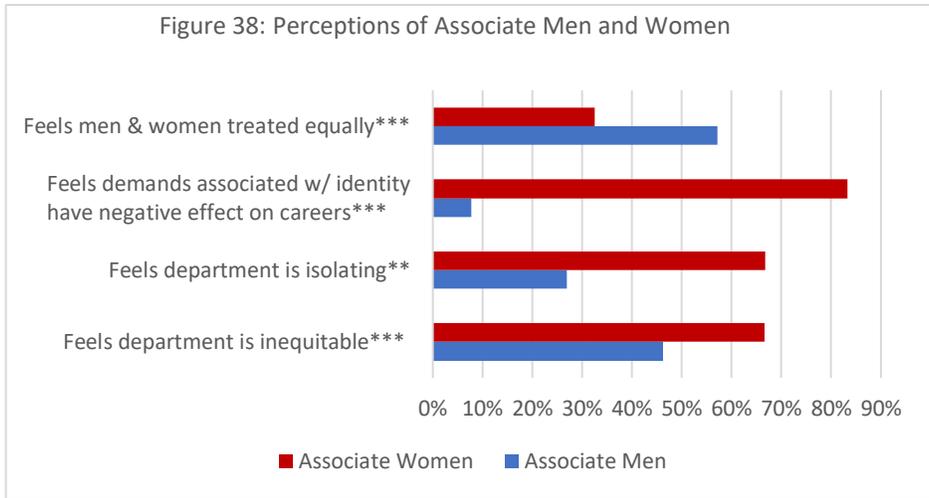
In this section, we focus on patterns among STEM faculty by **rank and gender**. We explore whether and how rank and gender affect STEM faculty's experience with inclusion, shared decision-making, and research collaboration. UMass ADVANCE interventions aim to develop systemic and sustainable approaches to address faculty disparities at the intersection of gender and rank. As the findings indicate, **campus interventions must foster inclusion specifically for women Associate professors in STEM.**

Faculty are grouped by Non-tenure-track men (n=38), Non-tenure-track women (n=36), Assistant professor men (n=33), Assistant professor women (n=29), Associate professor men (n=26), Associate professor women (n=42), Professor men (n=105), and Professor women (n=63).

Feelings of inclusion among STEM faculty are shaped by gender and rank. As Figure 37 shows, women across ranks feel less valued for their research than their male counterparts. Assistant professor and Professor men STEM faculty feel the most valued for their research. **Women Associate professors feel the least valued for their research (31%) and service (33.3%).** These findings resonate with national studies on the "ivory ceiling" for Associate women, as they devote themselves to teaching, mentoring, and service – activities that build campus communities but hold less value at research-intensive universities. Women Professors do report feeling very valued for their service.

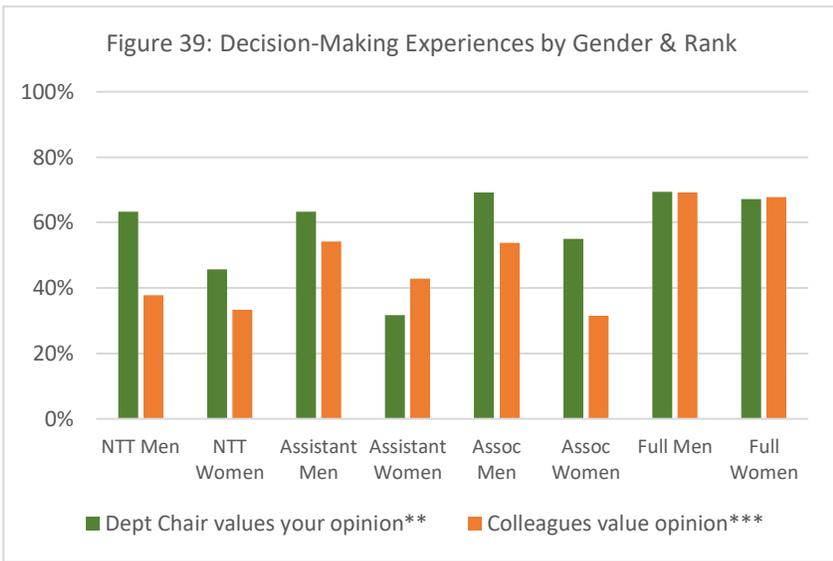


Comparing just Associate-level men and women faculty, Figure 38 reveals stark differences in perceptions of campus climate. Just **32.5% of Associate women believe that men and women are treated equally** in their departments, compared to nearly 60% of Associate men. Associate women are **over eleven times as likely to report demands related to their identity groups have had negative effects** on their careers. Associate women are the most likely across groups to report that their departments are inequitable and isolating.

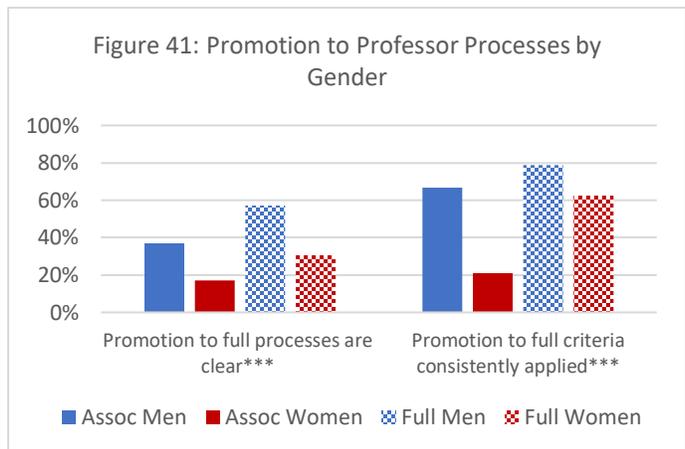
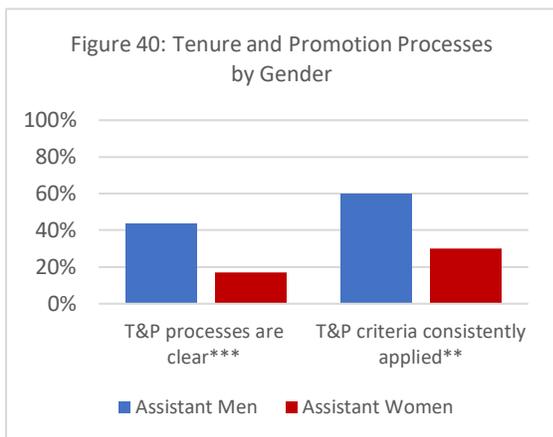


In the context of decision-making, a little more than half of STEM faculty generally report feeling that their opinions are valued by chairs/heads – with the exception of non-tenure-track (NTT) and Assistant professor women. As

Figure 39 shows, **only 31.8% of Assistant women faculty feel their chrs/heads value their opinions.** Among colleagues more generally, **NTT members feel very undervalued by colleagues.** However, **Associate women STEM faculty, relative to any other group, feel the least valued by their colleagues in decision-making.**

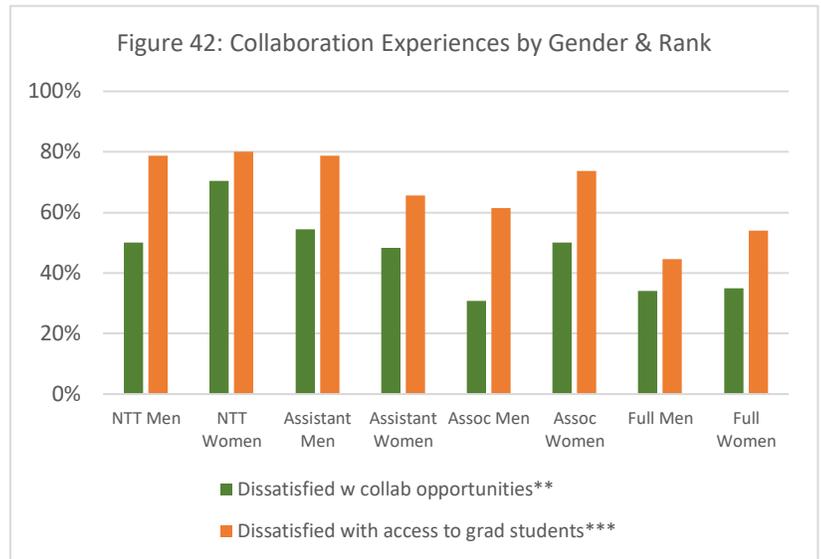


As indicated in Figure 40, among Assistant professors, men are more likely than women to report that tenure and promotion processes are clear and that criteria are applied consistently. **Only 17% of Assistant women faculty in STEM report**



that tenure and promotion processes are clear. Among tenured faculty, as shown in Figure 41, men are much more likely than women to report that promotion to Professor is clear and that criteria are applied consistently. Only **17% of Associate women faculty in STEM report that promotion to Professor processes are clear.** These findings suggest that there is a disconnect in transparency surrounding personnel processes by gender and rank that often leaves most women uncertain about their next career steps.

On average, STEM faculty across ranks report enjoying collaboration very much; however, collaboration opportunities vary by gender and rank. As Figure 42 shows, **Assistant professors are some of the most dissatisfied with research collaboration opportunities among tenure-track faculty.** Assistant men and women are also deeply unsatisfied with access to graduate students. **Associate women report satisfaction levels similar to Assistant professors, suggesting that, unlike men, their collaboration opportunities do not improve with tenure.**



Gender and Caregiving Status

In this section, we focus on patterns among STEM faculty by **caregiving status and gender**. We explore whether and how caregiving and gender affect how STEM faculty experience inclusion, shared decision-making, and research collaboration. UMass ADVANCE interventions aim to develop systemic and sustainable approaches to address diverse faculty experiences, including the experiences of STEM faculty who are primary caregivers of children and adults at home, to support their inclusion and retention. As the findings indicate, **interventions must specifically support women STEM faculty who are caregivers**.

43% of survey respondents identified as primary or co-caregivers of either children or adults. Faculty are grouped by non-caregiving men (n=105), non-caregiving women (n=79), caregiving men (n=93), and caregiving women (n=88).

Feelings of inclusion among STEM faculty are shaped by caregiving status and gender. As Figure 43 shows, **caregiving men feel less accepted by their colleagues and less connected to their departments than non-caregiving men**. Non-caregiving women’s feelings of acceptance and connection are comparable to caregiving women, but non-caregiving women feel the least accepted by colleagues and connected, with just over half of non-caregiving women feeling connected.

Caregiving women feel the least valued for their research, as shown in Figure 44. They feel much less valued for their research than caregiving men (41.3% compared to 63%), which suggests that caregiving shapes perceptions of faculty as researchers in gendered ways. More so, **caregiving women are the least likely to believe that men and women are treated equally in their department of any group**, shown in Figure 45. Both caregiving women and men are more likely than their non-caregiving counterparts to feel that demands associated with an identity group have

Figure 43: Gender, Caregiving, and Feelings of Inclusion

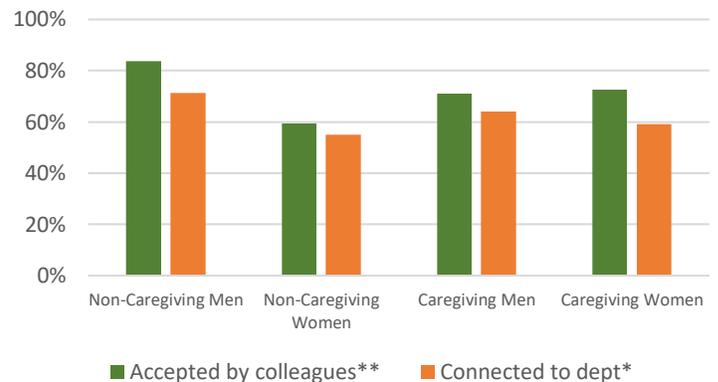


Figure 44: Feeling Valued for Research by Gender & Caregiving Status**

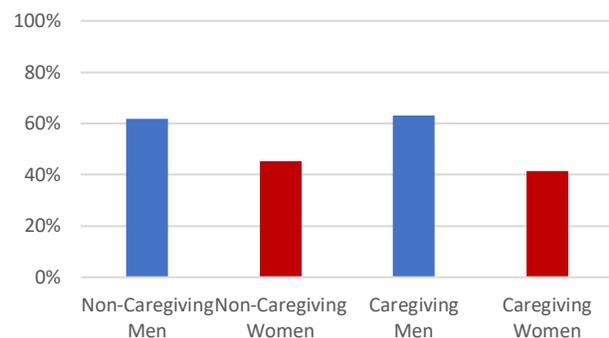
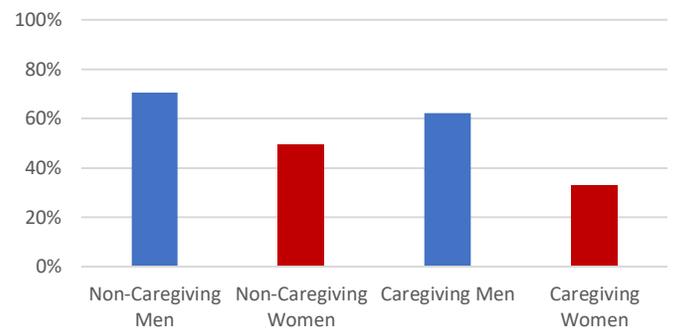
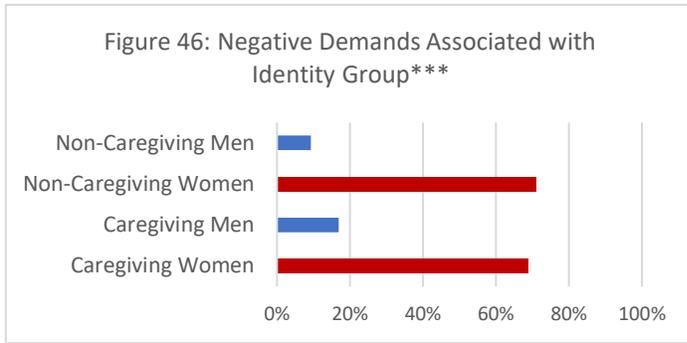


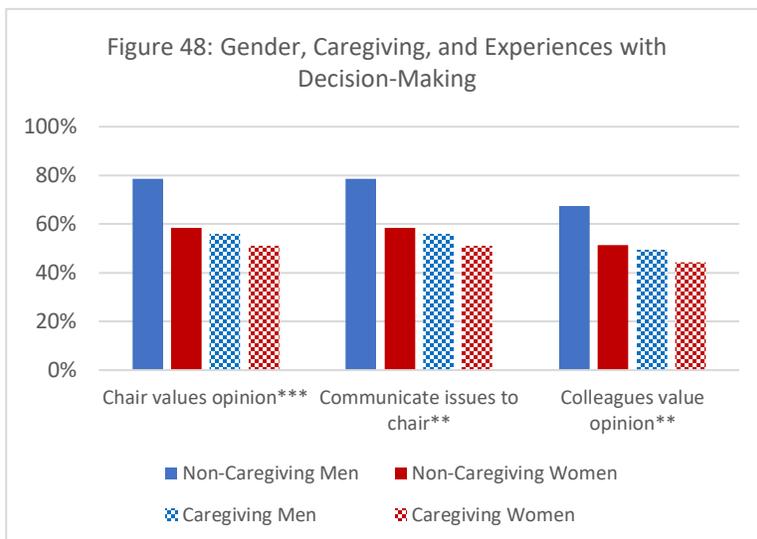
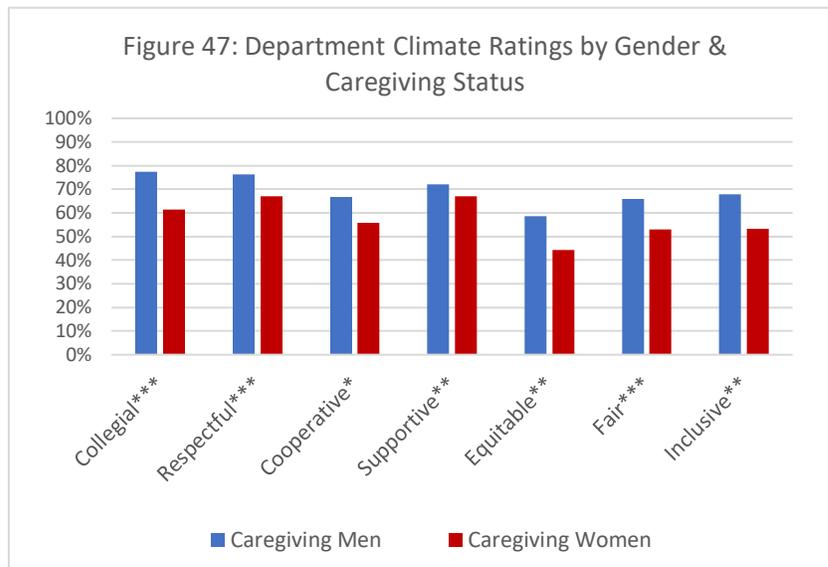
Figure 45: Perceive Equal Treatment of Men & Women by Gender Caregiving Status***



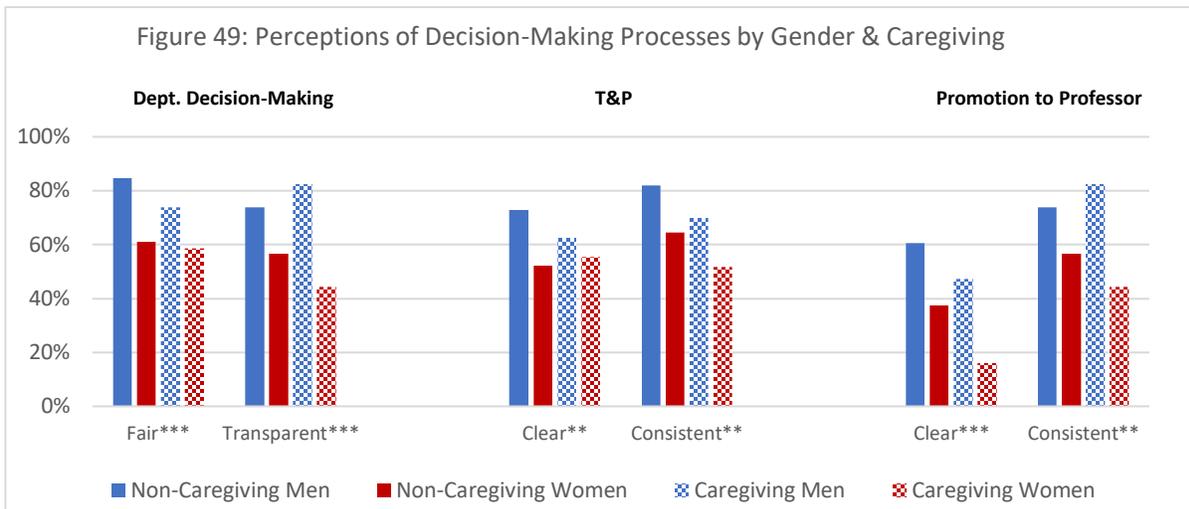


negatively impacted their career, as shown in Figure 46, suggesting that caregiving influences men’s careers as well as women. However, women are much more likely to report negative demands than men.

Finally, just comparing caregiving men and women, Figure 47 shows that **caregiving women rate their departments lower than caregiving men on most climate measures. Caregiving women report that their departments are less collegial, respectful, cooperative, supportive, equitable, fair, and inclusive than caregiving men.**



Departmental decision-making is also shaped by gender and caregiving status for STEM faculty. As Figure 48 shows, **non-caregiving men feel the most valued** by department chairs and colleagues, and they most frequently communicate issues to their chair. **Caregiving STEM faculty feel that their opinions are the least valued in decision-making, and fewer than half of caregiving men and women feel valued by colleagues.**



As Figure 49 shows, **caregiving women are the least likely to feel that departmental decision-making is fair or transparent.** Similarly, for personnel decisions, **caregiving women are least likely to report that tenure & promotion or that promotion to Professor procedures are clear and consistent.** Promotion to Professor is the least transparent for caregiving tenured women: only 16% find the process clear, and 44.4% believe the criteria are consistently applied. **Caregiving men find departmental and personnel decisions to be less transparent than non-caregiving men,** except they believe promotion to Professor criteria are consistently applied. These findings suggest that caregiving STEM faculty, but especially caregiving women, feel excluded from key decision-making processes in their departments.

On average, men STEM faculty report enjoying collaboration regardless of caregiving status, as shown in

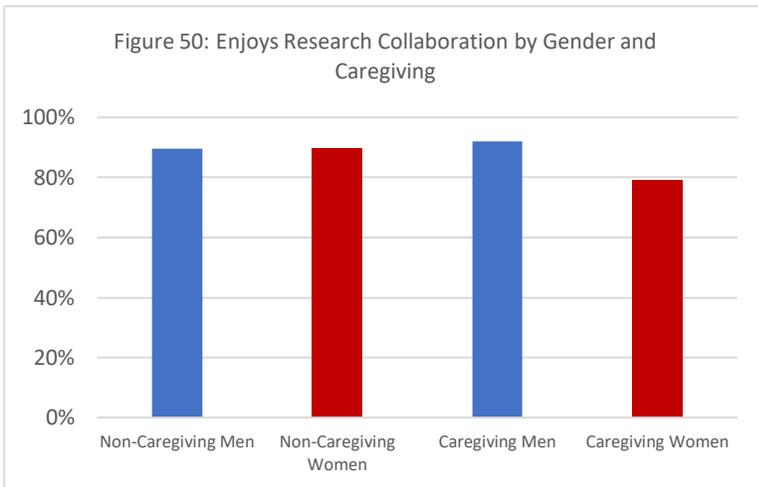
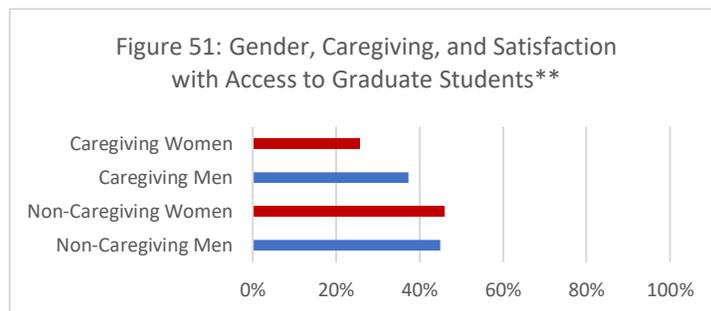


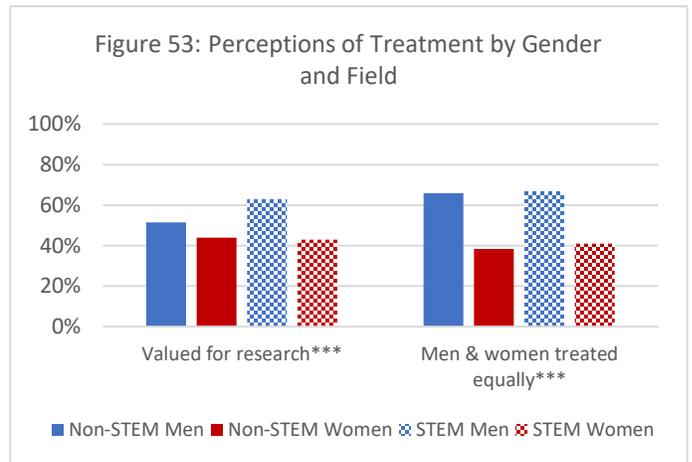
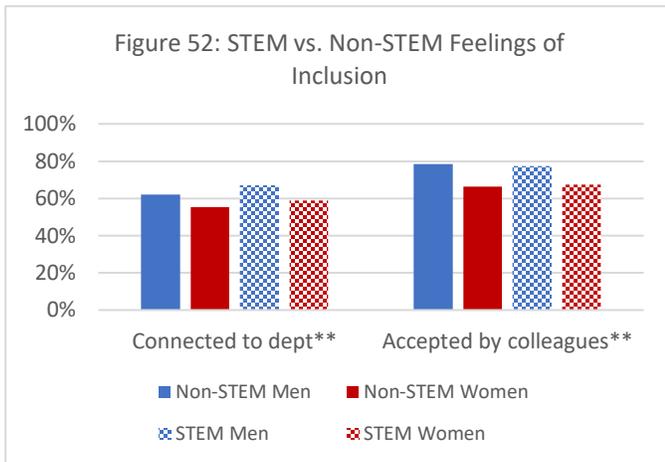
Figure 50. **Caregiving women report enjoying collaboration slightly less than other groups.** All groups are dissatisfied with collaboration opportunities like access to graduate students, but caregiving women are the least satisfied, shown in Figure 51. **Only 25% of caregiving women are satisfied with access to graduate students,** suggesting that they may have unique barriers to research collaboration.



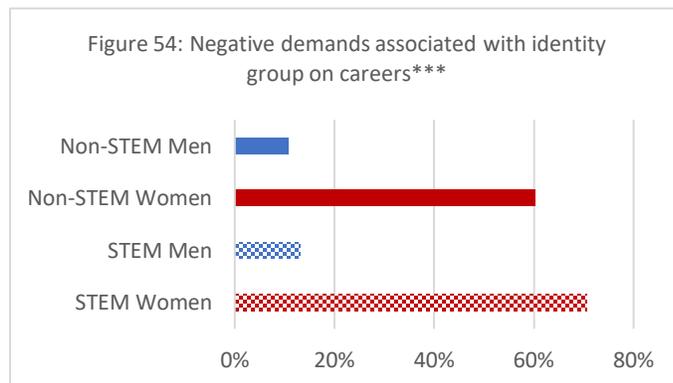
Comparing STEM and non-STEM Faculty

In this section, we focus on **patterns between STEM faculty and non-STEM faculty by gender** in the areas of inclusion, shared decision-making, and research collaboration.¹⁸ While the findings indicate similar patterns for women faculty in both STEM and non-STEM fields, there are some differences between women in these fields. UMass ADVANCE interventions aim to develop systemic and sustainable approaches to equity and inclusion in STEM, particularly for women, but seek to transform university culture and policy in ways that will support campus equity and inclusion more broadly.

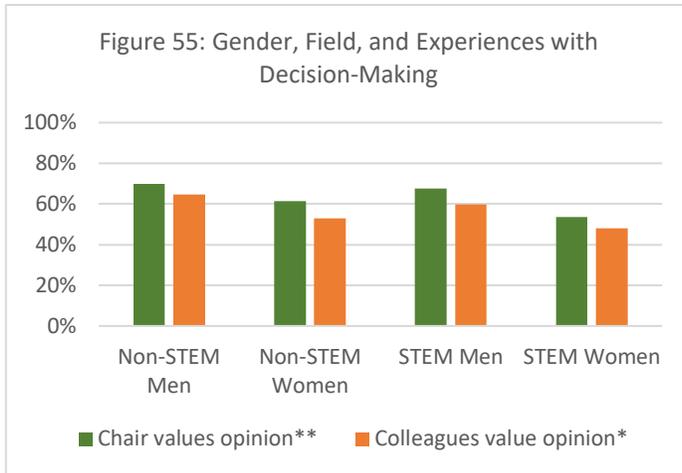
64% of survey respondents are in STEM fields. Faculty are grouped by non-STEM men (n=42), non-STEM women (n=92), STEM men (n=204), and STEM women (n=180).



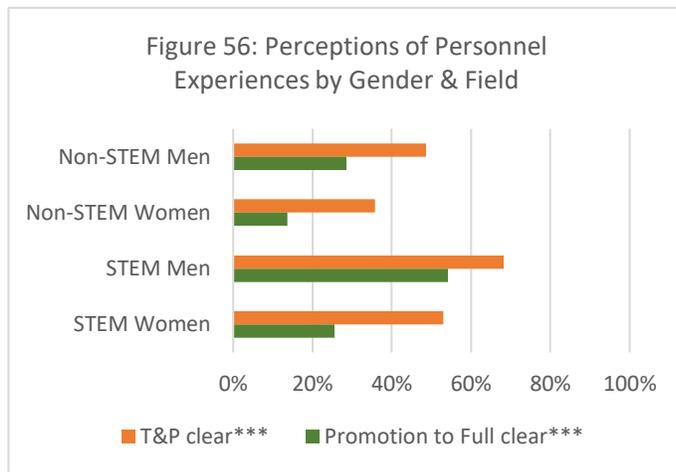
Feelings of inclusion among UMass faculty are shaped by gender. As Figure 52 shows, **women faculty in STEM and non-STEM disciplines on campus feel similarly less connected to their departments and less accepted by colleagues** than men faculty. Similarly, Figure 53 shows that **women faculty regardless of discipline feel less valued for their research than men**. Women are also less likely to perceive men and women as being treated equally in departments than men, in both STEM and non-STEM. **Men in STEM feel the most valued for their research** on campus (63%), compared to just 43% of STEM women.



Women are also much more likely to report experiencing negative demands on their careers based on their identity group than men, as shown in Figure 54; however, women in STEM are more likely to experience negative demands than non-STEM women, with **70% of STEM women faculty experiencing negative demands**. Taken together, these findings suggest that the gendered trends surrounding inclusion hold across disciplines and departments on campus.

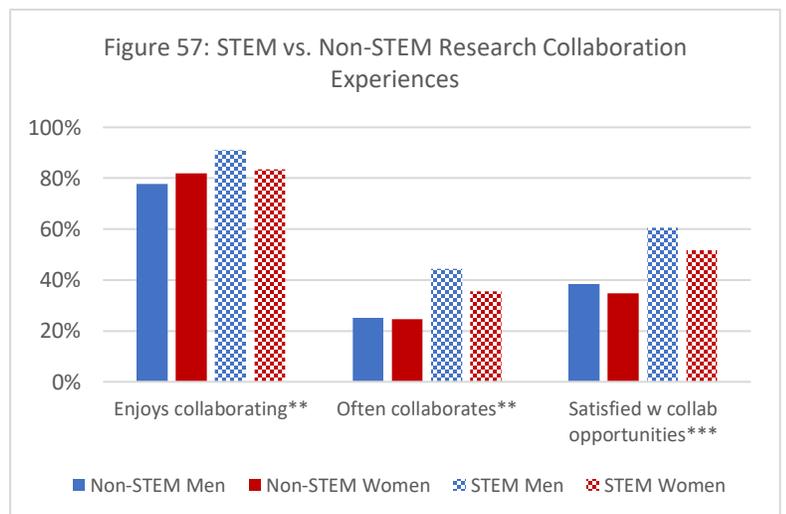


Departmental decision-making is also shaped by gender, although there are important differences between STEM and non-STEM fields. As Figure 55 shows, women faculty feel less valued by men in departmental decision-making. However, **STEM women feel the least valued of any group by their chairs (53.7%) and their colleagues (48.1%)**. STEM men also feel less valued than non-STEM men in departmental decision-making.



In personnel decisions, women across campus are less clear of processes than men, but **women in non-STEM fields appear to be the most disadvantaged**. As shown in Figure 56, **only 35.8% of non-STEM women find tenure & promotion processes to be clear (compared to 53% of STEM women), and just 13.6% of tenured non-STEM women find promotion to Professor processes clear (compared to 25.5% of STEM women)**. These findings on promotion to Professor are especially troubling, as most women on campus are in the dark on this important career step.

UMass faculty across campus report enjoying research collaboration very much. However, as Figure 57 shows, **STEM faculty collaborate more frequently than non-STEM faculty, with STEM men most often collaborating on research. Non-STEM faculty are less satisfied with collaboration resources than STEM faculty, with non-STEM women being the least satisfied of any group**. Among STEM faculty, women are less satisfied with collaboration resources than men.



Implications for Action

These faculty survey findings inform UMass ADVANCE interventions and priority areas to promote gender equity. UMass ADVANCE aims to develop **systemic** and **sustainable** approaches to transform the university. We will assess the effects of our interventions listed below in AY2022-2023, but we aim for long-term impacts on the university community beyond the award's lifespan. With the goal of institutional transformation in mind, UMass ADVANCE partners on interventions and workshops with the Chancellor's Office; Provost's Office; Offices of the Deans in the College of Social and Behavioral Science, College of Natural Sciences, College of Engineering, and the College of Information and Computer Science; Office of Faculty Development; Office of Equity and Inclusion; Office of Research and Engagement; the faculty union, the Massachusetts Society of Professors; and University Analytics and Institutional Research.

Our R3 Model of Change

UMass Advance focuses on three necessary elements for faculty success: resources, relationships, and recognition (R3 model). Through a combination of research, programming, and policy changes, the goal of UMass ADVANCE is to provide sufficient **resources, relationships** (including mentoring) and **recognition** of collaboration in our three key areas of research, inclusion, and decision-making. We suggest suggests that if faculty, irrespective of gender, nationality, race/ethnicity, or field, have equal access to the resources necessary to do their work, relationships with colleagues, and recognition for the work that they do, faculty will be more successful, and the institution will be more inclusive and equitable.

(1) Research Collaboration

Survey data suggest that we need interventions aimed at ensuring that all faculty can access resources and relationships to support collaborative research. All STEM faculty enjoy collaborating with UMass colleagues on research, but faculty, and especially women, are generally dissatisfied with collaboration opportunities on campus. ADVANCE provides opportunities for faculty to meet and locate potential collaborators. Because internal funding especially drives women's collaborative research on campus, ADVANCE provides several internal grant funding opportunities.

UMass ADVANCE will address **collaboration** inequities through:

- Funding internal [Collaborative Research Seed Grants](#) to support research teams committed to equity and inclusion. Funding includes opportunities to support graduate students as part of collaborative research teams.
- Resources for faculty to build diverse and equitable research collaborations, through [workshop trainings](#) and tools such as [collaboration best practices](#) and sample MOUs (memorandums of understanding).
- Funding internal relationship-building grants through the [Mutual Mentoring grants program](#).
- Building opportunities to make connections through the UMass Scholar's Network with equity and inclusion built into the framework
- Relationship-building activities, such as research interest-based events, aimed at increasing opportunities for faculty to meet colleagues, connect over shared interests, and locate potential collaborators.
- Including not only PI-status, but also co-PI status on Annual Faculty Reviews (AFRs) and in grants software (Kuali) and reporting to ensure that collaborative work is visible

- Recognition of women’s research excellence through newsletters, campus announcements, and [our website](#).
- Providing best practices for crediting collaboration to administrators and Personnel Committee members
- Providing best practices for ensuring faculty collaborative work is appropriately recognized and credited in personal statements and on annual reviews.
- Making equity and inclusion explicit part of internal university-wide funding calls
- Meeting regularly with Associate Deans for Research, to ensure that equity and inclusion are front and center on their agendas.
- Highlighting research visibility for women faculty members, which may encourage greater student interest in their labs.

(2) Inclusive Community

Building a healthy and inclusive community requires time and regular opportunities for faculty members to meaningfully interact with one another. UMass ADVANCE interventions will work to develop long-term, sustainable opportunities for faculty to interact in equitable ways. Central to our interventions surrounding inclusion is faculty mentoring. We also are committed to recognition of women’s research excellence, as women STEM faculty, and particularly women from underrepresented racial minority groups, feel deeply undervalued for their research.

UMass ADVANCE will address disparities in **inclusion** through:

- [Best practice tools](#) and interventions to foster departmental inclusion, including how departments can better stimulate professional and social interaction and indicate valuing research, teaching and service.
- Disseminating [Best practices for mentors](#) and departmental mentoring programs to faculty members, Personnel Committees, and academic leaders, including [National Research Mentoring Network](#) training programs in faculty mentoring colleagues.
- Workshops for faculty aimed at helping them develop mentoring networks
- Funding [Mutual Mentoring Grants](#) to support faculty in developing robust professional networks and mentoring partners on campus.
- Developing Departmental Mentoring Plans with Provost’s office and Office of Faculty Development, which the Provost now requires for all new hires, and helping workshop mentoring plans.
- Resources and [training programs](#) for chairs/heads and administrators that focus on building supportive communities and ensuring voices are equally heard
- Establishing Bystander Training programs for faculty members and leaders, to ensure that faculty recognize and learn how to intervene and address micro-aggressions, bias, and discrimination
- Funding [Collaborative Seed Grants](#) that foster collegiality and cooperation among research teams and support the development of STEM women’s research collaborations
- Opportunities for faculty to interact and form relationships to foster inclusion, including the [Faculty Fellow Program](#).
- Campus talks and events centered on inclusion and equity, including the [Distinguished Annual Lecture](#) series
- Establishing annual [College Faculty Mentoring Awards](#) to recognize the vital role faculty serve in mentoring their campus colleagues.
- Creating annual Departmental Inclusive Best Practice Awards to recognize departments that have developed best practices in creating inclusive environments.
- Recognition of women’s research excellence through newsletters, campus announcements, and our website, and by working with University Relations to highlight STEM women’s accomplishments.

- Including recognition of faculty mentoring in Annual Faculty Reviews (AFRs) and promotion to Professor cases
- Establish a culture of inclusivity through engaging with ADVANCE Faculty Fellows

(3) Decision-Making

Shared decision-making requires thoughtful interaction, understanding different points of view, and clear and fair rules for voting and decision-making. Because women STEM faculty are less likely than men to view tenure and promotion criteria as clear and consistently applied, ADVANCE will work with to address women's lesser sense of clarity around tenure and promotion (including promotion to Professor) and provide mentorship best practices and trainings in this area. Feeling valued and heard by departmental leaders and colleagues are important components of inclusive decision-making, but women STEM faculty report feeling less valued and heard than men in departmental decision-making.

UMass ADVANCE will address disparities in **decision-making** through:

- Best practices around inclusive decision-making, including [workshops](#) and [tools](#) aimed at Chairs/Heads on building supportive department communities, transparent decision-making, and ensuring voices are equally heard.
- Providing best practices workshops and tools for [clear and consistent rules](#) for voting and other decisions.
- Providing trainings aimed at Chairs/Heads and Personnel Committees focused on developing equitable approaches to personnel decisions.
- Provide Bystander Training that helps identify how to run more inclusive meetings.
- Interventions, including a best practices mentoring tool for promotion & tenure, focused on ensuring that all faculty have clarity around tenure and promotion criteria, and how those criteria are applied.
- Provide "Leading to Change" workshop to engage leaders in developing more effective change strategies
- Mentorship opportunities, best practices, and trainings to address women's lesser sense of clarity around tenure and promotion, including promotion to Professor.
- Annual college-level awards for departments with inclusive and strong shared decision-making and transparent governance
- Provide [Mutual Mentoring grants](#) to develop best practices in shared decision making
- Highlighting best practices on campus through panels and social media
- Present awards celebrating departments and other units with democratic and effective decision-making models
- Make gendered patterns in representation, promotion, and leadership more visible by working with Provost's Office and UAIR to present faculty dashboards focused on equity goals

For more information on UMass ADVANCE, including our tools and workshop calendar, please visit <https://www.umass.edu/advance/>. Questions, feedback, or suggestions can be sent to advanceprogram@umass.edu.

APPENDIX: Survey Questions

Unless otherwise noted, measures were reported on 5-point Likert scales and, for the purpose of this report, were recoded as dummy variables (0=no, 1=yes).

Collaboration

- Do you like collaborating with faculty at UMass Amherst on research?
- How often do you have opportunities to collaborate with other faculty at UMass Amherst on research?
- How satisfied are you with the amount of opportunities for research collaborations with faculty at UMass?
- How satisfied are you with your access to graduate students for research collaborations?
- How satisfied are you with your access to Internal grants to support your collaborative research at UMass?
- Which of the following factors facilitate your research collaborations with other colleagues at UMass (select all that apply)?
 - Research topic similarity
 - Research complementarity
 - External funding
 - Shared internal funding at UMass
 - Physical resources on campus
 - Graduate student in common
 - Physical proximity of offices/labs
 - Physical proximity of social spaces
 - Teaching
 - Shared committee service
 - Social connections
 - Referral by someone else
 - Something else

Inclusion

- Do you feel you connected to your department or program?
- Do you feel accepted by colleagues in your department or program?
- How valued do you feel by colleagues in your department/program for your research?
- How valued do you feel by colleagues in your department/program for your teaching?
- How valued do you feel by colleagues in your department/program for your service?
- How satisfied are you with the amount of professional interaction you experience with other faculty in your department or program?
- How satisfied are you with the amount of social interaction you experience with other faculty in your department or program?
- Do you feel demands or expectations associated with your identity group have had an effect on your pursuit of career goals?
 - Strong positive effect (1)
 - Mild positive effect (2)
 - No effect (3)
 - Mild negative effect (4)
 - Strong negative effect (5)

- Please rate your department/program in the following dimensions:
 - Contentious (-2) to collegial (+2)
 - Disrespectful (-2) to respectful (+2)
 - Individualistic (-2) to collaborative (+2)
 - Competitive (-2) to cooperative (+2)
 - Unsupportive (-2) to supportive (+2)
 - Inequitable (-2) to Equitable (+2)
 - Unfair (-2) to Fair (+2)
 - Isolating (-2) to Inclusive (+2)
- In your opinion, do men and women faculty in your department/program receive equal treatment in areas of recruitment, promotion, and resources?
- In your opinion, do racial minority faculty and White faculty in your department/program receive equal treatment in areas of recruitment, promotion, and resources?
- In your opinion, do immigrant and domestic faculty in your department/program receive equal treatment in areas of recruitment, promotion, career advice, and resources?

Decision-Making

- How consultative is your department head or chair in making decisions?
- In the decision-making process in your department, how much does your department head or chair value your opinion?
- If you have any concerns about departmental issues how often do you communicate these to your Head or Chair?
- In the decision-making process in your department how much do your colleagues value your opinion?
- Is the process by which decisions are made in your department/program fair?
- How transparent are the decision-making processes about policies, procedures, and personnel actions in your department/program?
- How clear are the criteria for tenure and promotion and the process by which this decision is made at UMass?
- How consistently are the criteria for tenure and promotion applied to all candidates?
- How clear are the criteria for promotion to Professor and the process by which this decision is made?
- How consistently are the criteria for promotion to Professor applied to all candidates?
- How often are you asked to take on a leadership role in important committees or initiatives in your department/program?

Notes

- ¹ Correll, Shelley J. 2004. "Constraints into Preferences: Gender, Status, and Emerging Career Aspirations." *American Sociological Review* 69(1): 93-113.
- ² Ridgeway, Cecilia L. 2011. *Framed by Gender*. New York: Oxford University Press.
- ³ Misra, Joya, Laurel Smith-Doerr, Nilanjana Basgupta, Gabriela Weaver, and Jennifer Normanly. 2018. "Collaboration and Gender Equity among Academic Scientists." *Social Sciences* 6(25).
- ⁴ Abramo, Giovanni, Ciriaco Andrea D'Angelo, and Gianluca Murgia. 2013. "The Collaboration Behaviors of Scientists in Italy: A Field Level Analysis." *Journal of Informetrics* 7(2):442-454.
- ⁵ Corley, Elizabeth and Monica Gaughan. 2005. "Scientists' Participation in University Research Centers: What Are the Gender Differences?" *The Journal of Technology Transfer* 30(4):371-381.
- ⁶ Mickey, Ethel L. 2019. "[STEM Faculty Networks and Gender: A Meta-Analysis](#)." ARC Network White Paper.
- ⁷ Smith-Doerr, Laurel. 2004. "Flexibility and Fairness: Effects of the Network Form of Organization on Gender Equity in Life Science Careers." *Sociological Perspectives* 47(1):25-54.
- ⁸ We define STEM as National Science Foundation-supported fields.
- ⁹ Fincham, Jack E. 2008. "Response rates and responsiveness for surveys, standards, and the Journal." *American Journal of Pharmaceutical Education* 72(2): 43.
- ¹⁰ Menachemi, Nir. 2011. "Assessing Response Bias in a Web Survey at a University Faculty." *Evaluation & Research in Education* 24(1): 5-15.
- ¹¹ No respondents identified as transgender. For more information on challenges collecting transgender-inclusive data in workplace surveys, see <https://www.hrc.org/resources/collecting-transgender-inclusive-gender-data-in-workplace-and-other-surveys>.
- ¹² Fall 2018 campus data. Sources:
https://www.umass.edu/oir/sites/default/files/publications/factbooks/facultystaff/FB_fs_07.pdf;
https://www.umass.edu/oir/sites/default/files/publications/factsheets/employees/FS_emp_02.pdf;
https://www.umass.edu/oir/sites/default/files/publications/factbooks/facultystaff/FB_fs_04.pdf
- ¹³ Eight items asked faculty to report the degree to which their departments are collegial, collaborative, cooperative, inclusive, supportive, equitable, fair, and respectful on a series of bipolar scales from -2 to +2. These eight items were recoded such that 0 = negative perception or neutral (e.g. department is isolating) and 1 = positive perception (e.g. department is inclusive). In some instances, we report a mean score of the recoded climate measures (on a scale from 0-1, with 1 being the most positive perception of department climate).
- ¹⁴ Collins, Patricia Hill. 2000. *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment*. New York, NY: Routledge.
- ¹⁵ Crenshaw, Kimberle. 1991. "Mapping the margins: Intersectionality, identity politics, and violence against women of color." *Stanford Law Review*. Jul(1):1241-99.
- ¹⁶ Browne, Irene and Joya Misra. 2003. "The Intersection of Gender and Race in the Labor Market." *Annual review of sociology* 29:487-513.
- ¹⁷ Misra, Joya, Jennifer Hickes Lundquist, and Abby Templer. 2012. "Gender, Work Time, and Care Responsibilities Among Faculty." *Sociological Forum* 27: 300–23.
- ¹⁸ See note 8.